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SELECTIONS

FROM THE

RECORDS

15324

OF

THE GOVERNMENT OF INDIA,

HOME DEPARTMENT.

1868

No LXIX.

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PAPERS

RELATING TO

CATTLE DISEASES.

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RELATING TO

CATTLE DISEASES.

From W. HUDLESTON, Esq., *Secretary to the Government of Madras, to the Secretary to the Government of India, Home Department,—(No.* 366, *dated* 10*th February* 1868.*)*

As requested in Mr. Under Secretary Geoghegan's letter of the 17th ultimo, No. 242, I am directed by the Right Honorable the Governor in Council to transmit a complete file of the correspondence relating to cattle disease in the Madras Presidency.

PROCEEDINGS OF THE MADRAS GOVERNMENT, REVENUE DEPARTMENT, DATED 27TH OCTOBER 1863.

READ THE FOLLOWING PROCEEDINGS OF THE BOARD OF REVENUE, DATED 24TH SEPTEMBER 1863, No. 6084.

Read the following letter from J. I. MINCHIN, Esq., *Collector of Kurnool, to the Secretary to the Board of Revenue,—(No.* 107, *dated* 16*th July* 1863.)

I have the honor to forward for the consideration of the Board the accompanying communication from Captain Nelson on the subject of the cattle murrain, which is at present raging in his neighbourhood.

2. There is no doubt that this disease is the cause of enormous losses to the agriculturists throughout the presidency, and by checking the growth of stock, must prevent that extension of cultivation which, under the present agricultural condition of the country, is checked solely by the want of stock and population.

3. Under these circumstances the importance of the question to the Government interests cannot be over-rated.

4. The disease has on previous occasions been the subject of report, and is, I believe, acknowledged to be to animals what the small-pox is to man.

5. Amongst cattle it is highly infectious and contagious, but I have not heard of its being either between cattle and human beings.

6. I am unaware of the exact measures alluded to by Captain Nelson as carried out by the Home Government during the ravages of the late murrain amongst sheep in England. It is clear that all such measures as he describes could not be carried out without legal enactment, and even then might not be safe in this country.

7. If, however, inoculation were to prove of any use as a preventive, the advantages attending it would be incalculable, and the experiment should at least be tried.

8. The services of the Government vaccinators might be made useful in this way, and perhaps the people may be more willing to subject their cattle, than their own persons, to the operation.

9. I trust, however, that the subject may be taken into serious consideration, and that the opinion of those experienced in the diseases of cattle be obtained.

10. The annual loss to the wealth of the country by this disease must be very considerable, and I think that Captain Nelson has done good service in endeavouring to draw prominent attention to it.

From CAPTAIN T. NELSON, *to the Collector and Chief Magistrate, Kurnool,—(dated 8th July* 1863.*)*

Within the last three months cattle disease has carried off many hundred head of cattle. In this country however severely a murrain may show itself nothing is done; the people do nothing, and the Government does nothing. Two years ago when the flocks of Wilts and Dorsetshire were attacked with small-pox, Government appointed a commission: stringent measures were taken to prevent the disease spreading. No sheep could be removed from the infected district; the tainted were killed and burned, and the rest *inoculated*. The disease disappeared. I humbly submit that something ought to be done here. The disease in question, which is now reducing the herds by *half*, shows itself first in a refusal of food, the ears droop, the eyes run water, purging commences, which in a few days becomes a bloody flux, and the whole body is covered with large pustules, the animal generally dies between the fifth and tenth days when with a piece of cloth you may sweep the body completely free of hair and cuticle; it comes off as if it had been scalded.

2. I should propose *inoculation* as an experiment. Hitherto there has been kept up and extensive Government cattle breeding farm in Mysore: might not the people attached to that establishment and to the gun bullocks know something more of these cattle diseases than the poor Carpoo owner of a few pairs? Might not an intelligent farrier or two be spared for a month to inoculate as I have proposed?

3. Having brought this matter thus prominently to your notice, I am sure you will see the importance of taking steps to check a disease which is the main cause, I believe, of the price of bullocks having risen nearly cent. per cent. in the last eight years.

The Board resolve to submit the above papers to Government, with the request that they may be communicated to the Inspector General, Medical Department, and to the Commissary General, for the submission of their views on the subject, and that any information on the records of

those departments bearing on the question may be communicated to the Board. Any public papers connected with the Government measure in England to which Captain Nelson alludes might with advantage be obtained from the Secretary of State. The Board do not feel that the matter is yet ripe for action; but the importance of the subject in a country where agriculture holds so important a position cannot be questioned. The Board have drawn the attention of all collectors to the serious diminution in stock which was brought to light by the last quinquennial returns, and have requested them to inquire into the causes, and to report on the remedial measures that they would suggest. Drought and disease have wrought great havoc among cattle in the last few years, and it may be feared that in some localities the progress of agricultural operations may be actually impeded to a severe extent, if means cannot be devised for checking the destruction. The connection between epidemic diseases in man and beast is deserving of careful consideration, and the Board submit, for the consideration of Government, whether the attention of the Medical Department throughout the presidency might not be advantageously called to the general subject of cattle disease. In conjunction with the revenue and commissariat officers, they might institute themselves local committees to collect and digest facts, and to consider and propose remedies, when some good can scarcely fail to result from their inquiries.

Orders passed by the Madras Government,—(No. 1931, *dated 27th October* 1863.*)*

The Commissary General will be requested to state whether any such disease as Captain Nelson reports has ever occurred among the public cattle at Honsoor; and if so, to state what is known of its cause and the best treatment for it. Similar application will be made to the other Governments in India.

2. The Board's suggestion will be referred through the Public Department to the Principal Inspector General, Medical Department, who will be asked to express an opinion on the question of inoculation. The Government think it very desirable that the experiment should be tried.

Read the following letter from COLONEL JOHN HILL, *Commissary General, to the Secretary to Government, Revenue Department, Fort Saint George,—(No.* 205, *dated* 31*st October* 1863.*)*

I have the honor to acknowledge the receipt of the Order of Government No. 1931, dated 27th October 1863.

2. The officer at Hoonsoor has been requested to furnish such information as he can afford, regarding the disease now prevailing with such fatal effect among the horned cattle in the Kurnool District, which information shall be transmitted to you as soon as received.

3. In the meantime I may mention that Major Loudon, who was for many years at Hoonsoor, states that the disease appears to be a form of that known by the public cattle attendants as the burra azar, or murrain, and I herewith forward reports* describing the outbreaks among public cattle, of a disorder somewhat similar to that brought to notice by Captain Nelson, and the remedies used on these occasions.

* Letter from Captain Harvey to the Commy. Genl., 19th August 1811.
Copy of a letter from Lieut. Cubbon to Captain Harvey, 25th August 1811.
Letter from Captain Harvey to the Commy. Genl., 30th August 1811.
Letter from ditto to ditto, 15th October 1811.
Letter from Lieutenant Loudon to ditto, 15th November 1852.

4. The diseased parts should be thoroughly cleansed two or three times a day with alum water, and a solution of sugar of lead applied, after which camphorated oil to keep off the flies. The animal should have drenches of raggy flour and onions boiled to the consistency of gruel, given three or four times a day.

5. Dr. Gilchrist recommends bleeding. Firing the animal on the top of the neck on both sides, and fomentations of the usual native kind over the whole body, together with warm drenches according to the nature of the disease.

6. Every means should be used to prevent the spread of the disease; healthy cattle should if possible be moved from the neighbourhood of infected localities; this proved particularly successful in Mysore, when the Amrut Mahal was in existence, and in seasons of sickness when the casualties among private cattle, which were not moved, were counted by thousands, the Government herds very frequently escaped unscathed.

7. If Government move in the matter, it should look chiefly to prevent the spread of the disease. In view to this, the outbreak and site of the disease should be made as public as possible. Cattle owners should be warned to avoid as much as possible the infected districts.

8. Where the disease has shown itself, change of food should be recommended, and likewise a change of place if possible.

9. In most cases of recovery, the animal will be found useless for months, if not for life, the old saying that "prevention is better than cure," is therfore in this instance, particularly applicable.

Extract from a letter from Captain Henry Harvey, *Assistant Commissary General, to the Commissary General,—(dated 19th August 1811.)*

Para. 2.—"The cattle in reserve having been moved from their usual stations and separated into small portions, were distributed amongst those pastures in the vicinity, which appeared to promise most favorably, and the detachments which returned from command were retained at some distance on this side of the farm, and no communication was permitted with the parties before grazing there.

3. "The result of these arrangements, I am happy to say, has been tolerably successful. The disease has evidently abated amongst those portions which might be considered to have been exposed to the

infection; and of those returned from command and kept separated from the rest not one bullock has been attacked. Up to the 15th instant, twenty-nine draft bullocks including calves, three carriage bullocks, and seven forage bullocks have died. The number of casualties is certainly great, but within these few days they have been decreasing, a less number than before are taken sick, and of those a greater proportion recover. It may therefore be inferred that the severity of the disorder is abating.

4. "I am, however, sorry to remark that some of the detachments which have left this depôt appear to have carried the distemper with them. Five bullocks have died and thirteen have been left behind sick of the carriage cattle which marched on the 16th ultimo to Bellary. One bullock has died and four are sick of the detachment of nineteen bullocks which marched on the 22nd ultimo to Chittledroog, and the party is unable to proceed. Eleven bullocks have died of the party which marched to Nundidroog and Rayacottah on the 26th ultimo; all are said to be affected with the *great* disease. I have not received particular accounts from other detachments, but I apprehend that many casualties may be expected at Bangalore.

5. "The strong, bleak westerly winds which have prevailed for some time, unaccompanied with the fall of rain which is usual at this season of the year, are generally considered, and I think justly so, to be the remote but generating cause of the disorder. The air has now been purified by some smart showers; and a conclusion may be drawn from the facts above stated, that the exciting cause (whatever it might have been) existed before the departure of the detachments above mentioned, and that it has now ceased or abated, as appears to be shown by the cattle in reserve gradually growing better, and those which return from command not being affected at all.

6. "Whether the disorder is contagious or simply epidemic, in what part the animal is originally affected, and what mode of treatment should be adopted for his relief, I have as yet been unable satisfactorily to determine. As the safer mode, however, the malady has been treated as infectious, and the diseased cattle separated from those which are unaffected. The Natives have administered those medicines which by them are considered advantageous, although it is evident from the name which they apply to it, and by their mode of treatment, that they are entirely ignorant of both the cause and the seat of the disorder.

7. "I am, however, inclined to think it approaches nearly to the description given of the malignant epidemic fever, which has so frequently ravaged the herds on the Continent of Europe, and which in superstitious times, was there then, as it is now by the inhabitants of India, attributed to the wrath of a divinity. Religious ceremonies were performed to appease it, and in the present instance, I have of course indulged similar prejudices of the Natives."

Extract from a letter from LIEUTENANT M. CUBBON, *Sub-Assistant Commissary General, to Assistant Commissary General,—(dated 25th August* 1811.)

PARA. 3.—"The party of cattle that arrived at Bangalore in the latter end of last month, did not appear at that time to have brought the disorder which has prevailed at Seringapatam; but some of the bullocks must certainly have been infected, for I am sorry to say the disease has broken out with exceeding violence, and continues to extend notwithstanding the precautions taken to separate the infected from the sound bullocks on the first appearance of disorder. Out of 67 bullocks that were taken sick, 10 only have recovered, 38 have died, and 19 are not expected to live. The disorder is considered to be contagious, and the most dangerous to which the cattle are subject. It assumes the appearance of a violent dysentery, extremely rapid in its progress, as a bullock seldom outlives the fifth day, and continues to defy any sort of mussaul. The only medicine from which any benefit has been derived is a cooling mussaul, the chief ingredient of which is opium; but even this has been ineffectual to subdue the disorder excepting in a very few cases."

Extract from a letter from CAPTAIN HENRY HARVEY, *Assistant Commissary General, to the Commissary General,—(dated 30th August* 1811.)

PARA. 10.—"With regard to the nature of the disorder itself, I cannot form any correct judgment. On dissection every part of the body appears perfectly sound, and I am induced to consider the head as the seat of the disease, although the bowels are afterwards affected. A purulent discharge from the nostrils, eyes, mouth and ears, excoriating and ulcerating the parts, and a violent diarrhœa accompanied of course with minor symptoms are the principal characteristics of the disorder, which I do not think is inflammatory. Many remedies have been tried, and relief is certainly afforded by one mussaul composed of a variety of leaves and woods, the effect and even the names of which are probably unknown to Europeans."

Extract from a letter from CAPTAIN HENRY HARVEY, *Assistant Commissary General, to the Commissary General,—(dated 15th October* 1811.)

PARA. 2.—"I have the greatest satisfaction in acquainting you that the influence of the contagion which lately prevailed amongst the public cattle in Mysore, has nearly, if not entirely, ceased; as well amongst the cattle to the westward as amongst those which were temporarily stationed to the northward of Seringapatam.

3. "Although the air has been purified by a very heavy fall of rain, and the distemper in consequence subsided, I cannot avoid supposing that the greatest benefit has been derived from the mode of treatment latterly adopted, and my opinion has been strengthened in this respect by the judgment of a medical gentleman, who accidentally paid some attention to this subject, on a former occasion

4. "I have already in my communications on this subject, described the symptoms, and what I apprehended to be the seat of this disorder. I have yet seen no reason to alter my opinion in this respect, but although the treatment adopted by the Natives did not coincide with the theory I had formed, it appeared to me imprudent to reject it altogether, more especially as it did not interfere with the system I proposed to pursue.

5. "Their mussauls therefore to which they ascribed the effect of cooling the blood, continued to be administered; and I observed they were well calculated to support the strength of the animal, who for many days refuses all kind of sustenance; but being convinced that the disorder was, in the first stages at least, confined to the head, that a purulent and most offensive matter was discharged from the nose, and afterwards from the eyes, mouths and ears, I resolved to try the effect of injections with the view of healing the putrid sloughs that might have been formed in the nostrils. A solution of sugar of lead, afterwards of alum, was employed for this purpose, and I am happy to say that the result answered my expectations. The disorder was certainly rendered more mild, the animal sooner recovered his spirits, and relished his food, the proportion of casualties was not so great, and I think I may venture to assert the progress of contagion was in a great degree diminished."

From LIEUTENANT J. LOUDON, *Deputy Assistant Commissary General, to the Commissary General, Madras,—(No. 59, dated* 15*th November* 1852).

Dated 5th November 1852.

In continuing my report on the burra azar, from which the fifth batch of calves of the Training Depôt is suffering, I have the honor to state that about the date of my last letter the disease suddenly increased and continued to do so until the 10th instant, since which no fresh cases have taken place.

2. Twelve casualties have occurred since my last report, and eleven calves remain very sick. I am led from their appearance, however, to hope that the majority of these will recover.

3. The disease, as it has shown itself in the present instance, is known to the servants of this department by hearsay only, and Dr. Gilchrist's Treatise contains no description corresponding with it. It is, I am told, of frequent occurrence among the young stock of the Amrut Mahal to which it chiefly confines itself.

4. Captain Harvey's account of the burra azar, as it appeared in the months of June, July, August, September and October 1811, entirely coincides with the symptoms of the present disorder. I have accordingly adopted the remedies which he then tried and found beneficial, and their application has been attended with the best results.

5. The disease first shows itself in the eye, and has at first the appearance of the inflammation, which frequently affects that organ in the hot season; on examination, however, the discharge is found to be of a purulent nature, and that a similar fœtid fluid is commencing

to run from the nose and mouth, causing extensive ulceration and emitting a most offensive smell; the flies attracted by this speedily deposit their ova on the diseased parts, but more especially about the eye, which, if not treated in time, is completely eaten out.

6. The disorder seems in its first stages to be confined to the head alone, and if not allayed extends after three or four days to the stomach and bowels, as after that time the chief symptom of the murrain ensues, viz., violent diarrhœa.

7. Captain Harvey's treatment, which has proved so successful, consists in frequent injections of a solution of sugar of lead into the nose and ears, and applications of the same to the ulcerated parts of the mouth and eyes after they have been cleansed with alum water, after which to prevent the flies from depositing their eggs on the diseased parts camphorated oil is freely applied.

8. The remedies, if applied at the commencement of the disease, are found to stop its progress; the animals soon recover their spirits and begin to graze, and in a few days the symptoms of disease entirely disappear. The annexed memorandum shows the numbers of calves seized, the number recovered and under treatment, and the number of casualties since my last report.

MEMORANDUM.

The number remaining sick as per last report		2
The number since taken ill		132
		134
Deduct—		
The number recovered	93	
Do. under treatment	29	
Do. of casualties	12	
		134

Orders passed by the Madras Government,—(No. 2030, dated 11th November 1863.)

Copies of these papers will be forwarded to the Collector of Kurnool, for communication to Captain Nelson, and for publication of the information they contain in his gazette.

2. Mr. Minchin will report to what locality the disease is limited at present, and warn cattle owners of the risk of contagion.

3. Colonel Hill is requested to forward any other papers in his possession connected with the diseases of cattle, which he considers it would be desirable to publish.

From LIEUT.-COL. E. E. MILLER, *Depy. Commy. Genl., to Secy. to Govt., Fort Saint George,—(No. 215, dated 16th November 1863.)*

With reference to letter from this office, No. 205, dated 31st October 1863, and the 3rd paragraph of Orders of Government, No. 2030, 11th

November 1863, I have the honor, by desire of the Commissary General, to forward an original letter* from Dr. Bidie, the Medical Officer at Hoonsoor. It is hoped that the information it contains may prove useful to the owners of cattle throughout the country.

* To be returned at convenience.

From G. BIDIE, Esq., M. D., *Asst. Surgn., Mysore Grazing Farm, to the Commy. Genl., Madras,—(No.* 283, *dated* 11*th November* 1863.*)*

With reference to your letter No. 7578, giving cover to proceedings of Government, Revenue Department, of 27th October 1863, No. 310, I have the honor to inform you, that the disease therein referred to is well known in Western Mysore, where it is called *doddah rogah* and burra azar. It is very fatal, often destroying nearly all the stock in a village. Natives have consequently a great dread of it, and on the first alarm of its appearance, not only keep their cattle away from, but themselves also avoid, visiting the affected village and its grazing grounds. It is both epidemic and infectious.

2. *Causes.*—The primary causes of this terrible malady are quite unknown. It occurs at all seasons of the year, but would appear to be most virulent during the hot season. Fatigue, insufficient food or water, and whatever reduces the vital powers, predispose to an attack.

3. *Symptoms and nature of disease.*—The disease is in its nature a peculiar sort of inflammation, attacking the mucous and serous membranes of the head, chest, or abdomen, the skin subsequently becoming covered with a pustular eruption. The proximate cause of the various phenomena that constitute the disease would appear to be some change in the constituents of the blood. It has no affinity whatever with small pox, as that disease rarely affects the gastro-enteritic mucous membrane, whereas it rarely escapes in this disease. It is more like *plague* than small pox. The characteristic symptoms are, drooping cold ears, hair standing on end, frequent weak pulse, running at the eyes and nose, scanty high coloured urine, and purging, terminating in a bloody flux. As the disease advances the body may become covered with pustules, the disease generally proving fatal in a few days; but when the membranes of the brain are affected the animal may die in a few hours with the symptoms of apoplexy.

4. *Treatment.*—Lowering remedies must be avoided. If the animal be seen at an early stage of the disease, and there be no purging, the following purgative dose may be given :—

Castor oil, 8 ounces

This should be followed by warm fomentations, and the following febrifuge drench given thrice daily :—

℞. Nitre, half an ounce.
Camphor, one and half drachm.
Opium, ten grains.
Turmeric, one ounce.
Mustard, two ounces.
Ginger, quarter ounce.
Conjee, one quart.

As the disease advances, arrack in doses of from 2 to 4 ounces may be given once or twice a day, and the following astringent and cordial drench twice daily :—

℞. Gum Acacia, two ounces.
Black Pepper, quarter do.
Womum Seeds, half do.
Arrack, two ounces.
Conjee, one quart.

If there be no head symptoms 10 or 15 grains of opium may be added to the above. When the head is affected, the whole of the neck should be freely fired.

5. With regard to inoculation it would, in my opinion, be a most dangerous measure, as the cases thus induced are just as likely to prove fatal as those originating in the ordinary way, and is certain to give rise to fresh cases, and thus increase instead of diminishing the ravages of the disease.

Orders passed by the Madras Government,—(No. 2071, dated 18th November 1863.)

A copy of Dr. Bidie's letter will be forwarded to the Collector of Kurnool, for communication to Captain Nelson.

2. Translations of the letter may be advantageously published in the District Gazettes. The Board will arrange for this being done.

READ THE FOLLOWING PROCEEDINGS OF THE BOARD OF REVENUE, No. 3685, DATED 17TH JUNE 1864.

Read the following letter from the Collector of Kurnool, No. 78, dated 17th May 1864.

I have the pleasure to forward a report drawn up by Veterinary Surgeon Thacker on the result of his visit to this district, to investigate the cattle murrain, which, from the papers circulated on the subject, appears to be prevalent in all parts of India.

2. It is not necessary for me to recapitulate what will be found detailed in Mr. Thacker's report. The personal interest which I felt in his inquiry, and the knowledge that my presence might very possibly be necessary to give that authority to his proceedings which would be requisite for success, made me desirous of accompanying Mr. Thacker throughout his inquiries, a wish which I was unable to carry out, owing to the order of Government placing me in temporary charge of the Bellary District. Before leaving Mr. Thacker I had the satisfaction of knowing that he was settled in the village of Ravypad, where cattle murrain was raging, and where he would have the fullest opportunity of testing his proposed treatment, and thoroughly investigating the disease.

3. The result of the full experience gained by Mr. Thacker at this most favorable opportunity is more encouraging than was to be expected:

seventy-five per cent. of all the cases treated were cured, and there seems no room to doubt that the disease is amenable to treatment, and that by proper measures its ravages can be very greatly checked.

4. The mode of treatment recommended by Mr. Thacker, and a clear account of the symptoms of the disease, forms an appendix to his report. This paper will be translated into Teloogoo, and published as speedily as possible in the District Gazette. I also propose to strike off separate copies of the paper in Teloogoo for sale to the ryots at one anna. These instructions can in the same way be published in all the District Gazettes of the Presidency, and thus be made generally available. The collected papers on the subject show, not only that the disease is universal, but also that no rational treatment has yet been anywhere attempted.

5. While improved medical practice should greatly reduce the percentage of mortality amongst cattle attacked with the disease, it is to remedial measures in lessening the risks of contagion that Mr. Thacker looks chiefly for reducing the losses now occasioned by the epidemic. It is quite certain that nothing short of compulsion by a penal enactment can enforce the adoption of the measures advocated by Mr. Thacker. Knowing that the natives were perfectly aware of the contagious nature of the disease, I was astonished, on accompanying Mr. Thacker in his medical visits, to find the utter recklessness of their practice. The fact is, that the nature of their houses, and the want of necessary appliances and assistance, renders it impossible for a native to carry out strict isolation of diseased cattle in his own premises. It is unquestionable that at present the sound and diseased cattle mix together promiscuously in the ryot's house and yard, and those not attacked are driven out at the usual hour for pasture with the village herd, spreading everywhere the seeds of a most dangerous malady. Unless some means be found to put a stop to this it will be impossible to eradicate the disease. It may lie dormant for a time, but will again and again break out and keep down the stock of the country in spite of its increasing wealth.

6. I have conversed frequently on this subject with Mr. Thacker, and after much consideration, can think of no means so suitable for the end in view as those suggested in his report. A short Act embodying the provisions he recommends might be passed in the local Legislative Council, and a breach of its provisions might be made punishable under Sections 269 and 270 of the Indian Penal Code.

7. I do not by any means advocate the universal application of such an Act, as it might be made an instrument of much tyranny and injustice; but power should be given to the Government to apply it to any particular locality, and the local authorities who applied for it would be responsible for its necessity, and for its provisions being enforced with discretion.

8. The following are the few simple provisions which it would be necessary to embody in the Act:—

First.—That where the Act had been declared applicable to any locality the inhabitants of any village might be required, on the order

of the collector, to erect sheds for the accommodation of the sick cattle in some locality outside the village, fenced so securely as to prevent the possibility of healthy cattle getting in, or sick cattle getting out.

Second.—That a respectable agriculturist of the village be appointed to the charge of the sick lines, under the control of the village moonsiff, and be remunerated by a fee on each sick animal under his charge, payable only on recovery.

Third.—That on any animal being attacked with murrain, the owner must at once report the fact to the village moonsiff, and remove it to the sick lines, subject for neglect to punishment under Section 269 of the Indian Penal Code.

Fourth.—The person appointed to the charge of the sick lines should be responsible for proper care of the sick animals, and should provide their gruel and medicines, to be paid by the owner at a fair rate to be fixed from time to time by the collector of the district.

Fifth.—That the owner of any building in which a sick animal has been for a period of twenty-four hours, or upwards, be compelled forthwith to white-wash the walls, and cow-dung the floor of the same, subject to a fine not exceeding Rs. 50.

9. It may be remarked that no provision is made for the burial of the bodies of animals that have died of the disease, a point in England much insisted upon;—the customs of the country render such unnecessary in India. A dead animal is here immediately removed by the chucklers and eaten, apparently with perfect impunity, however death may have been caused.

10. It is impossible to bring forward statistics to show the actual losses of cattle by this disease in this presidency. I believe it to be a moderate estimate to state that, on an average, at least two thousand head of cattle are swept away yearly in every district by the epidemic, which is as constant in its ravages as cholera amongst human beings. Fortunately the weaker and less valuable animals are in general the victims, but even with this compensation the loss to the agricultural community is enormous, and its effects must be felt in checking the increase of cultivation which would otherwise progress even more rapidly than at present, and thus lowering the public revenue. In the interests of the State it is imperative that efficient measures be taken to grapple with this evil.

11. There is a striking fact in Mr. Thacker's report which cannot fail to be remarked. The villagers of Ravypad, while the disease was raging amongst their cattle, as soon as the revenue authorities had left the neighbourhood, ceased to avail themselves of Mr. Thacker's assistance, and had so little confidence in his treatment, that rather than undergo the trouble it entailed on them, they preferred to let their cattle die by leaving them to nature. The services of a skilful veterinary surgeon were available gratis, and yet he would have remained without opportunities of practice, in the midst of a violent epidemic, if Mr. Arbuthnot had not returned to Cumbum and ordered the ryots to place their sick cattle under his charge.

12. It is true that after evident success attended his treatment all this was changed; an emissary even came from a village in the Cuddapah District, where the disease was prevalent, to ask for Mr. Thacker's assistance when the fact of his cures became known; but the difficulty experienced in introducing the new practice makes me doubtful whether any commensurate results will follow the mere publication of a rational mode of treatment, the proper adoption of which ought to result in reducing the mortality fifty per cent. under this disease. Not only, as Mr. Thacker suggests, must the medicines be for some time provided gratis to the ryots, and the advantages of the new treatment be impressed upon them by the revenue authorities, but I think that a veterinary surgeon with a liberal staff pay should be appointed permanently to the special duty of teaching the natives how to treat the disease, and of enforcing the necessary remedial measures.

13. Such an officer should move from district to district wherever his services might be most required, and there should be attached to him a staff of pupils from the Madras Medical College, who might be willing to adopt this branch of the healing profession. These would rapidly acquire a thorough knowledge of the pathology of the disease and of its treatment, and by their means the benefits of superior veterinary knowledge could be extended more widely every year.

14. I can speak from personal experience of the zeal and patience displayed by Mr. Thacker while engaged in his recent inquiries in this district, and I am confident that the duties I have sketched above could not be entrusted to better hands. On this occasion he was not sent with such an object, but simply to investigate the disease, and I have not felt justified in detaining him longer in the district after that end has been attained.

15. I think that the result of Mr. Thacker's mission must be considered satisfactory, and as his visit to this district has caused him a loss of military pay, it only remains for me to recommend that an honorarium of one thousand rupees be paid to him, as well as the usual travelling allowance from Bangalore to Kurnool and back. The former charge can be met out of the salary for the assistant collector, and the latter out of the travelling allowance to officers, unexpended in the budget of charges for the district for the last official year.

REPORT.

Observing my services placed at the disposal of Government to investigate the causes of an epidemic disease amongst cattle in the Kurnool District, I started with all practicable haste hoping to find further instructions on reaching the district.

2. On the 21st of January I arrived at Kurnool, the collector being absent, I proceeded to join Mr. Arbuthnott's camp, and there, for the first time, had the opportunity of reading the correspondence on the subject.

3. Early in February the collector returned from leave, and on his advice I accompanied him on jummabundy, in order that his influence might be available in inducing the ryots to place their sick cattle under treatment and further the objects of my mission.

4. Although there were rumours of the disease being prevalent in all parts of the district as well as in the talooks, where we were located, we found, on close investigation, such reports referred to ordinary diseases of cattle, and not to the special malady, or murrain, which it was my business to investigate.

5. It was not until the 4th of March that we were summoned by the villagers to Boodacherla, and found the true disease, called in Teloogoo " Pedda Mossa Rogum." On pitching our camp in this village we found four buffaloes labouring under the disease, and it was reported that there had been seven previous cases, of which, being left to nature, three only had died.

6. On the morning of our arrival one animal died, and I was enabled to have a post mortem examination.

7. Until this time I was only acquainted with the disease by report, which had led me to consider it allied to, or identical with, the murrain that has for many years been known to veterinarians. The result of this post-mortem, and many others which I was afterwards enabled to make, confirmed my opinion on this point.

8. In this village only four cases came under my treatment, two of which were successful. At this period I must confess to much anxiety as to the success of my mission, it being doubtful whether a simple mode of treatment could be laid down to cope with so formidable a disease, and the apathy I found amongst the natives rendering its application doubly difficult.

9. At this time the collector (Mr. Minchin) was ordered to Bellary, and both he and the head assistant collector (Mr. Arbuthnott) had to proceed to Kurnool on duty; before they left Cumbum a violent outbreak of the disease was reported in the neighbouring village of Ravypad, and I arranged with the revenue authorities that my camp should be pitched there during their enforced absence.

10. On our arrival in Ravypad, on the 11th of March, we found that one hundred and twenty-nine cattle had been attacked, of which sixty-nine had died, seventeen recovered, and the remainder were at that time in various stages of the disease. In communication with the collector arrangements were at once made for my entering vigorously into the field of inquiry which was thus presented. On the 12th of March Messrs. Minchin and Arbuthnott left Cumbum, and from the date of their departure the co-operation of the people with my inquiry entirely ceased. They had no grounds for confidence in my skill, the mode of treatment prescribed gave them more trouble than they liked, and they objected to being moved out of their accustomed habits. With the exception of such cases as had been placed in my hands before Mr. Minchin's departure, no fresh cattle were entrusted to me for treatment, although the disease was raging throughout the village; fortunately Mr. Arbuthnott returned to Cumbum as soon as he was able, and by the

exertion of his influence I was enabled to take full occasion of the opportunity here afforded me of carrying out the inquiry for which I was sent to the district. Up to the close of April, I had forty-four cases under treatment, of which eleven were fatal and thirty-three recovered, a proportion which, considering the character of the disease, exceeded my expectations, and has proved satisfactorily its amenability to medical treatment.

11. Of the eleven fatal cases I must remark that almost all were poor weakly animals, and from my experience, cattle that were in good condition and well cared for, when placed early under treatment, recovered in almost every instance.

12. Before the end of April, the disease had died out in Ravypad, and being unable to find further scope for practice in that quarter, I rejoined the collector in Kurnool. At this time no epidemic of a violent character prevails in the district; the disease in a mild form is to be found in various localities, but as it offers no distinguishing differences of type from that which I have seen, and sufficiently investigated in Ravypad, Mr. Minchin concurs with me in thinking that the object for which I was sent to the district has been attained.

13. I must here state that there is one type of the disease most prominently dwelt on in all the printed reports which I have had no opportunity of witnessing. In this form of the malady the animal breaks out in pustules immediately after the attack, every other symptom being exactly similar to that form of the epidemic which I have met with. The natives state that the disease has this peculiar symptom during, or shortly after the rainy season, and not during the dry months in which I have been in the district. I am, of course, unable to state whether any modification of treatment may be necessary for this form of the disease, and it will be for the Government to consider whether further investigations on this point be called for.

14. Mr. Minchin is of opinion that it would not be right to detain me in the district for the length of time which might elapse before such cases could come under my observation. In my medical treatment of the disease my chief aim has been to confine myself to the use of such remedies as are procurable by the poorest ryot in the most remote village; it would have been a mockery to prescribe expensive English medicines which could never have been available to the agriculturists of this country. The remedies employed, camphor, nitre, opium, and catechu, are procurable in every bazaar. Datoora is a weed that grows in the fields, and cherayta is a plant found in almost every jungle. These medicines, in different proportions for the different stages of the disease, are the only ones which I found it necessary to administer. A detailed account of treatment will be found in an appendix. I would only here further remark that a most important point is supporting the animal with nourishing gruel, which the natives appear to have entirely neglected, as it is their practice to leave a sick beast for many days without food of any description, in itself sufficient to cause death.

15. Many suggestions have been offered as to the causes of this disease. It has been attributed to general uncleanliness, want of care, deficiency of proper food, atmospherical influences, and variations of

food at different periods of the year. I am only prepared to state that the disease is evidently epidemic in character, and in my opinion unquestionably contagious. With respect to original causes, I would only say in the words of an acknowledged authority on such subjects: "It is better to confess these are unknown rather than by a laboured and pretended explanation to endeavour to conceal our ignorance."

16. My experience during this inquiry has made me acquainted to some extent with the domestic economy of the natives as regards their treatment of cattle. I have been for weeks in their villages; have attended all my patients in the houses of the owners; and have thus, for the first time, become familiar with the native habits. I have found that valuable cattle have been well cared for, and the majority of cases have occurred in poor animals, which either from old age or the poverty of the owners, have not received such good treatment. A deficiency of food unquestionably creates a tendency to take the disease, and gives the patient less chance of successfully combatting it. The growing improvement in the condition of the agricultural class is a matter of notoriety, and, as I have before remarked, there is no neglect apparent in the care bestowed upon cattle that are considered worth the expense.

17. The cattle are housed with their owners, and are as well off as themselves in this respect. The general want of cleanliness in the houses of the people must be a cause of unhealthiness to man and beast. It seems almost beyond legislative remedy.

18. Considering that the natives of this country have been agriculturists for generations, I have been surprised at the utter ignorance displayed by them in the treatment of cattle under disease.

19. They are particularly quick in detecting the existence of disease, and of any changes which take place in it; their prompt perception of such changes is most marked, and with a proper mode of treatment laid down for their guidance should assist them to successful practice.

20. In this district when murrain has attacked the cattle, there has hitherto been no attempt at treatment whatever; the animals being left to struggle under the malady ten or twelve days without any effort even to support life, and I doubt not that in many instances they might have been saved without medical treatment if properly nursed and supported.

21. I consider the chief cause of the rapid extension of the disease after it has appeared in a village to be the extraordinary apathy and carelessness of the people in the matter of contagion. Those whom I have met seemed all to acknowledge that the disease was contagious, but none made the slightest effort towards prevention; isolation of sick cattle was never attempted, and the constant advice I gave on this subject was entirely disregarded. I have myself seen a miserable buffaloe calf, not worth five rupees, with fœtid mucous discharge from his nose and eyes, in close contact with a healthy bullock that was worth

at least a hundred rupees. On remonstrating with the owner, he could only give all excuses as to the difficulty of enforcing isolation, and such is the apathy of the native character that nothing short of compulsion by legislative enactment can, I think, remedy the evil.

22. As a professional man, sent specially by Government to investigate a subject of such importance, and which has given rise to such extensive references and general consideration, it appears necessary for me to offer an opinion on the various suggestions that have been made for the treatment of the disease.

An injection of sugar of lead into the eyes, nose, and ears, has been recommended: such would be attacking a local symptom instead of the disease, and I need hardly say must be utterly useless.

23. One officer speaks with astonishing confidence of possessing an infallible specific in common black salt. To call this simple purgative infallible is simply empirical.

24. Captain Nelson has suggested vaccination as a remedy. There is nothing in the nature of the disease to lead one to suppose that the introduction of the cow-pox virus would serve as a prophylactic. As remarked by Assistant Surgeon Bidie, murrain is a totally distinct disease from small-pox, and attacking different structures. Perhaps by vaccination was intended the introduction of matter from an animal infected with murrain to a healthy animal, or as more properly called inoculation. Inoculation is frequently referred to in the reports as the most likely remedial agent, and one which many seem most anxious should be tried.

25. Cases of inoculation in early times are reported in all histories of murrain, but the authenticity of these cases, or at all events the efficacy of the practice, is doubted by all the authorities of the present day. There can be little doubt that inoculation would produce the disease; but there is nothing to lead us to suppose that the disease thus taken would be in a mild form, or that having been once attacked by the disease would guard an animal from all future danger.

26. It appears to me that the practice of inoculation would be inducing what it is our chief object to prevent—a propagation of this most dangerous malady.

27. Such being the received professional opinion of the day, from which I see no reason to differ, I could not conscientiously carry out any experiments in this way without being prepared to give compensation to the owners of cattle for possible or rather probable loss.

28. As the collector stated his inability to provide any means for such an expenditure, I was unable to attempt the experiment.

29. Should the Government differ in opinion, and consider inoculation deserving of a thorough trial, I can see no means for its being done except on their own cattle.

30. I offer now such general remedial measures as appear to me to be advisable: their practicability I leave to be determined by the proper authorities.

31. The medical treatment of cattle under an attack of the disease will be found detailed in an appendix to this report. On this part of the subject I will only add, that simple as are the remedies I have prescribed, I fear that the ryots will take no care for their correct preparation, nor, till they have had practical proof of their value, would they go to the expense of purchasing them, absurdly trifling as that expense would be.

32. I beg to recommend that the remedies prescribed in my treatment be made up by Government, and kept in store by the tehsildars for distribution. As I before stated, they are procurable in every considerable village, and after the ryots have experience of the benefits attending their use, there is no doubt they will procure them for themselves.

33. I now proceed to describe such preventive measures as are necessary to check the spread of this malignant epidemic. For this purpose perfect separation of the sick from the healthy animals of the village should be enforced. On an animal being attacked, the owner should be compelled at once to remove it to a separate locality appointed for the purpose outside the village. A tope conveniently situated might be set apart for this object, or if none be available, it would be necessary to erect sheds to protect the sick animals from exposure to the sun or rain. This locality should be carefully fenced so as to prevent the possibility of healthy animals by any accident coming in contact with the diseased. The objections that would be raised to such a measure by the ryots would arise chiefly from the difficulty they would experience in providing attendance for their sick cattle at a distance from their own houses. To meet this, one of the servants of the village should be appointed to this special duty, who might be remunerated by fees levied from the owners of cattle under his care.

34. As a further precaution, in the case of any house or stable from which a diseased animal has been removed, the walls should be white-washed, and floors cow-dunged.

35. I believe that I have now stated all the measures which I consider desirable to be enforced, and have laid down a mode of treatment which, if pursued judiciously, should be followed by reasonable success. I am convinced, however, that the natives will require much guidance in the matter: if left to themselves it is probable that very little will be done, and after some time the state of affairs will relapse into the present condition of reckless neglect on the appearance of this epidemic.

36. The loss to the community and the Government by the present state of things is so great, a loss which in my opinion is in a great measure preventable, that I think it would be to the true interests of Government to appoint a qualified officer to the special duty of interesting the ryots how to treat the malady, and observing that the necessary measures are carried out.

37. An intelligent officer moving from district to district where his services might be most required—by gaining the confidence of the people, combatting their weaknesses, and insisting on the performance of the necessary measures to cope with the disease—might in a great measure bring it under control, and would unquestionably save thousands of rupees' worth of valuable property every year.

J. THACKER,
Veterinary Surgeon.

APPENDIX TO REPORT.

Murrain.—Called in Teloogoo 'Pedda Moosa Rogum,' is an epidemic, contagious typhoid fever, commencing in a general congestion, with mucous discharge from the eyes and nose, followed by inflammation of the "abomasum" or last compartment of the stomach and intestines, accompanied at certain seasons of the year with falling off of the hair, formation of pustules on the skin, and always ending in violent purging mixed with mucus and blood.

Symptoms.—The attack generally comes on gradually, evidenced by occasional shivering fits, the appetite slight, the animal appears dull, with dropping ears and a rough starring coat; the bowels costive, rumination ceased or slightly performed, eyes weeping, pulse quickened.

First Stage.

The appetite entirely gone, nose dry and hot, and which commences to discharge thick mucus, which also now takes place from the eyes; purging commenced; lining membrane of the eyelids of a dark red colour, pulse quick and small.

Second Stage.

Generally lying down from weakness, purging violent, very offensive, mixed with slimy mucus and blood, is passed frequently in small quantities, and attended with straining. The eyes become sunk, the countenance anxious, general restlessness, partial insensibility, and death. In this stage the pulse is generally imperceptible, or extremely quick and small.

Third Stage.

Post-mortem examination shows the abomasum or last compartment of the stomach, and portions of the bowels inflamed; attended sometimes with slight effusion or dropsy: this is the general appearance, and the exceptional cases and changes are not necessary to mention.

Treatment.—From the great tendency to run into a low typhoid type, and accompanied as it almost always is in the latter stages with violent debilitating purgation, and at some seasons of the year with a number of open discharging pustules, it is absolutely necessary that great care and moderation be observed in the administration of any medicinal agent, which might, and assuredly would if largely given, produce the very results which it is desirable to avoid.

It should always be borne in mind that our main object is to support the strength, and assist the curative powers of nature, through an attack that generally lasts from seven to ten and even fourteen days, during which time the patient partakes of little or no food.

The bowels being costive early in the disease, a mild laxative may be given, and to avoid the slightest chance of too much action it is safer to give small repeated doses; which end I think I have best obtained

by administering two or three ounces of finely powered sulphur in two quarts of gruel morning and evening, until some slight effect is observable.

As this is an inflammatory disease, the sedative and narcotic class of medicines are most appropriate. Of those easily procured in the bazars, and with which I have been most successful, the following may be given morning and evening :—

Camphor ...	... 2 drachms.
Nitre ...	... 2 ,,
Datoora ...	... 1 ,,
Cherayta ...	... 2 ,,
Arrack ...	... 4 ounces.

Dissolve the camphor in the arrack, carefully powder and mix the other ingredients, then add two quarts of gruel and carefully pour down the throat with a drenching horn.

When the diarrhœa commences it is not desirable to attempt suddenly to arrest it, as it is an effort of nature to relieve the system; but if allowed to go on to any large amount the debility produced would impede recovery, so that after it has existed about twenty-four hours, the following, finely powdered, may be added to the preceding prescription :—

Opium ...	... 1 drachm.
Catechu ...	... 3 ,,

The pustules which at certain seasons appear should be carefully washed twice a day, and the simple mixture consisting of camphor dissolved in oil should be applied twice a day to prevent a depcsit of flies' eggs and the generation of maggots; further applications will generally be found unnecessary, and they will become healthy as the internal disease subsides.

As soon as there are symptoms of improvement, the medicines should be diminished or discontinued, as the recovery is generally very rapid, and requires nothing beyond supporting the strength with gruel, to which may be added the dose of arrack in extreme weakness. As soon as the animal shows the slightest inclination for food, he should be frequently supplied with small quantities of green grass, raggy, sugar-cane, or cholum.

The following is the proper method of making gruel :—One pound of jonna or any other wholesome grain should be ground to a fine meal, and this meal be gradually mixed in two quarts of boiling water; to be given when cold.

In administering a drench, should the operation cause the animal to cough, the head should be immediately released, and no attempt made to continue giving the remedy for a few minutes; persistence in pouring down the draught at such a time would probably result in the suffocation of the animal.

Owners of cattle cannot be too strongly impressed with the necessity of separating any animal showing symptoms of this disease from their healthy cattle. The disease unquestionably spreads through the village herd by contagion, and by strict isolation of diseased cattle, the spread of it may be greatly prevented. Murrain is so formidable a malady, that under the most careful treatment there must be many fatal cases, and the ryots should never forget that prevention is better than cure.

It is most desirable that in any building where diseased cattle have been, the walls should be white-washed, and the floors cow-dunged, to make it safe for the use of healthy animals.

J. THACKER,
Veterinary Surgeon.

Ordered to be submitted to Government with the Board's recommendation that Mr. Minchin's proposals in the last paragraph of his letter for Mr. Thacker's remuneration be sanctioned.

2. The result of the inquiry and treatment of the disease must be deemed very satisfactory, as warranting the belief that this serious evil can be controlled with comparative ease; but the Board concur in the opinion that legislative action is necessary to compel the owners of diseased cattle to take reasonable precautions against injuring their neighbour's.

3. They leave the point for the consideration of Government.

PROCEEDINGS OF THE BOARD OF REVENUE, No. 3668, DATED 16TH JUNE 1864.

Read the following letter from the Collector of Coimbatore,—(No. 122, dated 8th June 1864.)

A few days ago I received with Board's Miscellaneous Circular No. L, dated 20th May 1864, extracts from reports from Bengal, &c., regarding the nature of the diseases which had been prevalent among cattle in the Bengal Presidency. Unfortunately for this part of the country, murrain has been and is now most severe amongst cattle. Understanding that Mr. McIvor, Superintendent of the Government Cinchona Plantations, had lost a number of valuable animals, and that he had taken trouble to ascertain the nature of the disease of which they died, I sent the above papers to him for perusal, with a request that he would, in view to its communication to Government, favor me with the result of his inquiries on the disease.

2. This he has now done, and I beg to transmit his original letter on the subject. His letter will, I believe, be found to contain the fullest and clearest account of the disease hitherto given. I have never heard

of a disease which has proved more fatal to cattle than that which is now raging on these hills. It is most infectious and insidious, and the chances are, that if measures are not at once adopted to separate the infected animal from the herd, the whole of them will be lost within five days.

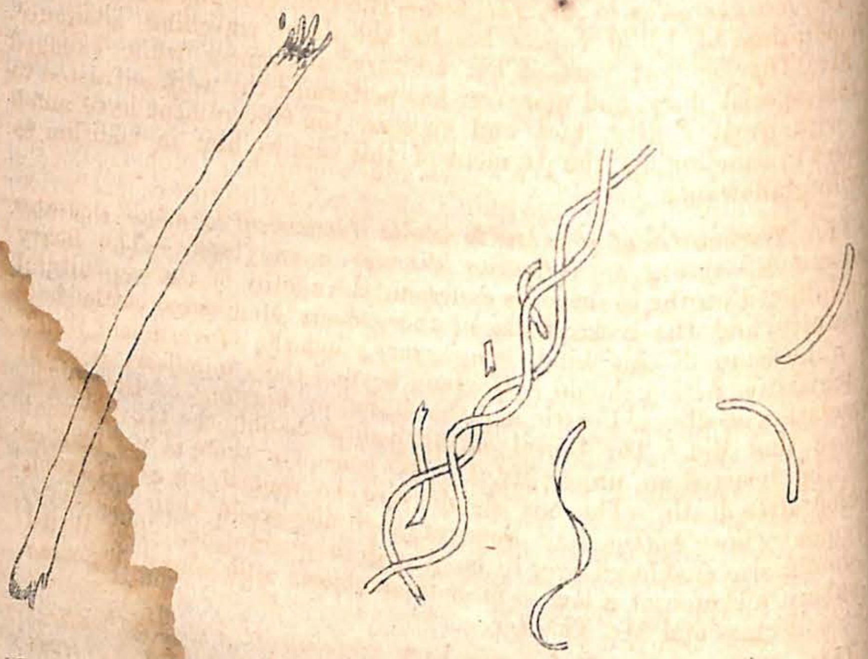
From W. G. McIvor, Esq., *Superintendent, Government Cinchona Plantations, to the Collector of Coimbatore,*—(*No.* 81, *dated 4th June* 1864.)

I have the honor to acknowledge your letter No. 270 of the 30th ultimo, with enclosures, relative to the cattle disease. These papers appear to describe two distinct diseases, one usually known as the cattle murrain, and characterized by eruptions in and running at the mouth, and eruptions on the body and feet. This disease has occasionally visited the hills; but where ordinary care is given seldom proves fatal. The disease described by Mr. Ladd appears to be identical with the one which lately attacked my cattle, and is the most fatal that it has ever been my misfortune to meet with. No amount of medicine or otherwise careful treatment of the animal seems to have other effect than that of prolonging their sufferings. Some of my cattle were very valuable, and I made great exertions to save them. Everything in the way of medicines, as digitalis, laudanum, calomel, catechu, &c., usually effective in inflammatory diseases of the bowels, was tried without effect. As the inflammatory symptoms still ran high, an endeavour was made to reduce this by copious enemas and cold compresses applied around the body, and frequently changed as they became hot: these took excellent effect and brought on a profuse perspiration, materially retarding the progress of the inflammation; the strength of the animal being supported during this treatment by nourishing drinks. However, out of eight cases treated in this way, only one recovered; their lives merely being prolonged from five to nine days. This result so completely disheartened me, that I made no further attempt to treat the cattle that were taken ill; and these all died on or within the third day. The most effectual way of preventing the spread of the disease, is to remove the unattacked cattle so soon as the symptoms of disease is observed. The symptoms in my cattle were as follows: at first the excrement showed signs of imperfect digestion, fragments of grass, grain, &c., passing only partly digested (being unacquainted with the disease, I did not attempt any treatment at this stage, but it is probable that it would be more effectual at this time than when the disease makes greater progress). The next symptoms in milch cows is the drying up of the milk, which takes place about two days before the cattle lose their appetite; after this purging sets in, with a running of water from the mouth always in all cases, and generally from the eyes also, with a mucus discharge from the nose; the breathing now becomes very laborious, with an offensive odour, and the pulse much accelerated, with every indication of a highly inflammatory state of the system; the tongue and mouth are free from swellings or pustules, the salivary glands are rather cold, but no other derangement

in the mouth can be detected. The excrement, which was previously thin and watery, now becomes mixed with clotted blood and mucus; at this stage the animals rapidly lose strength and shows signs of great suffering, especially in breathing, stretching its head along the ground and occasionally raising it apparently to relieve the difficulty of respiration; if the ear is now placed to the side of the animal, the air is heard to enter the lungs with a wheezing, which is succeeded by a dull noise. The discharge of blood and mucus has now become more frequent accompanied by severe straining, the mouth and tongue has become cold and slimy, the difficulty in breathing increased, with occasional severe coughing, symptoms of great suffering still being apparent by the restlessness of the animal frequently getting up and lying down; at this stage the eye begins to lose its brightness, indicating the approach of death, which generally takes place in two to three hours.

Never having seen this disease before, I was anxious to ascertain its nature, and therefore examined three of the bodies after death, and in every material point the three bodies were found to be alike affected. The lungs were found in an unnaturally distended and spongy condition and void of blood; the air tubes in a highly inflamed state, and nearly entirely closed by a deposit of serum; the liver was found much in the same condition as the lungs with reference to distension and inflammation, the spleen exhibiting the same appearance, with this exception that while some portions were found void of blood, others were overcharged and exhibiting dark spots; in these mortification had apparently commenced prior to death; the kidneys were choked with blood, the ducts of this gland being highly inflamed; the bladder was found full of water and blood; while the urethra, from the highly inflammatory state of the inner coating, was so thickened as almost to block up the passage. The ruminating stomach was found in apparently a healthy condition, but in the coating of the second stomach mortification had taken place, as it was so much decomposed that it could not be touched without falling to pieces; this continued for some distance from the stomach when the mortification ceased, and the intestines showed the high inflammatory condition previously noticed, the mucus membrane being inflamed and thickened to nearly a quarter of an inch; towards the anus this inflammatory condition gradually ceased until the parts resumed a healthy appearance. A microscopical examination of the blood taken from the heart, veins, and kidneys showed it to be unnaturally thin and watery, abounding in worms, some of them so large, that when found by the microscope, could be distinguished by the naked eye; these vermicular animalculæ were of various forms and generally jointed; the half inch magnifier showed them very distinct and abundant; a sketch is appended of a few of the principal forms as shown by the microscope; if these animalculæ are the cause of the disease, and not the effect of it, the external as well as internal application of turpentine might be beneficial, but I am strongly impressed that when the disease has made progress it so completely affects the whole system that I believe cure to be impossible; every symptom indicates the disease to be one of the blood. I believe this disease to be pleura-pneumonia which broke out for the first time in

Britain in 1847; but as I left England the following year I had no opportunity of seeing the disease there.



Vermicular Animalculae found in the blood of Cattle which died from Pleuro-Pneumonia or a similar disease.

The Board are much obliged to Mr. McIvor for his full report, which will be communicated to Mr. Thacker for his remarks.

2. The collector will furnish Mr. McIvor with a copy of Mr. Thacker's Kurnool reports, when the papers now in the press reach him.

Orders passed by the Madras Government,—(No. 1224, dated 13th July 1864.)

The papers above recorded are—

I. A report of the results of Mr. Thacker's Mission to Kurnool to investigate the nature, &c., of the murrain which has lately prevailed among cattle in that district.

II. A report of a very fatal disease among cattle at Ootacamund.

2. Mr. Thacker has performed his duty very well, and his report on the disease with the remedial treatment he proposes will be translated into the vernaculars, published in the District Gazettes, and circulated among the people. The collectors and their assistants and subordinates will also use their influence to induce the people to follow the treatment and preventive measures recommended by Mr. Thacker. The Board of Revenue will give effect to this order.

3. The questions submitted for the Orders of Government in the correspondence above recorded are the following:—

I. *Remuneration to Mr. Thacker.*—The Collector and Board propose an honorarium of 1,000 rupees besides the usual travelling allowance. As Mr. Thacker lost part of his military allowances while engaged on this special duty, and moreover has performed the work entrusted to him with great ability, tact and success, the Government have much pleasure in sanctioning the payment of this sum to him in addition to travelling allowance.

II. *The enactment of a law to enable Government to adopt measures to prevent the spread of infectious diseases among cattle.*—The heavy losses inflicted on the country by murrain, the apathy of the agricultural community, and the recklessness of the owners of diseased cattle show that a measure of this kind is necessary; but the Government think, that legislative action should not extend beyond the compulsory removal and isolation of diseased cattle and the burial or burning of the bodies of those that die. The burial of the bodies should, the Government think, be insisted on, unless Mr. Thacker considers there is no fear of infection after death. The law should also be framed so as to reach bandymen whose cattle may propagate such diseases in their journeys, and should also enable villages to be placed in quarantine. The Board will submit a sketch of a law to meet these objects after consulting some of the collectors and Mr. Thacker.

III. *The employment of a veterinary surgeon with a staff of medical pupils to go from district to district, and teach the people how to treat cattle diseases, &c., &c.*—This measure is not called for at present. The Government, however, think that much good may be effected by employing a skilful veterinary surgeon in investigating the nature of the epidemic diseases to which cattle are subject, and making the results known to the people. It will be ascertained in the Military Department whether Mr. Thacker's services are available for this duty, and whether he is willing to undertake it.

IV. *The supply of medicines gratis.*—It will be necessary at first to supply medicines; but the Government do not see that a gratuitous supply of them is at all called for. Mr. Thacker states that the drugs which he found useful are cheap and procurable in every bazaar.

V. *The trial of inocculation.*—The Government are disposed to have inoculation tried; but it must be done carefully and under Mr. Thacker's inspection, the owners of the cattle being assured that the value of those which may die under the experiment will be paid to them.

4. As to the disease which has lately prevailed among cattle on the hills, the Government resolve to forward Mr. McIvor's report to Mr. Thacker, with a request that he will state whether he is already acquainted with the disease.

5. Mr. Thacker, it is observed, has not seen any case in Kurnool with the pustular eruption mentioned by Captain Nelson. It is desirable that he should re-visit Kurnool at the proper time to do this.

Read the following letter from J. Shaw, Esq., *Officiating Principal Inspector General, Medical Department, to Chief Secretary to Government,*—(*No.* 188 *dated* 20*th June* 1864.)

* To be returned.

I have the honor to forward a report* upon the "rot" in sheep by Dr. Short.

THE ROT.

An epidemic among sheep prevailed in this district during the months of March and April, and a large number were destroyed thereby whilst a few shepherds took the precaution of removing the infected and sending them into towns to the butchers for slaughter. I was not aware of the prevalence of sickness at the time, when on the 20th March 1864 my own small flock, twenty in number, consisting of one half-bred Mysore ram, two yearlings, cross between the Merino and Coimbatore, three Mysore ewes, and ten common Madras ewes, and four lambs were taken by the shepherd to graze out near the village of Thinnaveram, which is 2½ miles distant from my house. On the third day a six months' old lamb was found dead; on enquiry the shepherd said that nothing particular had appeared to be the matter with the lamb, but that he had noticed that it had seemed dull the evening before and that a discharge flowed from the nostrils, but he did not think of any consequence. Some two or three days after two ewes were brought to me with a "swelling of the head" as it was called; on examination, a soft swelling was distinctly visible in the sub-maxillary space, and in one there appeared to be a choking feeling about the throat, as the animal frequently attempted to clear its throat, by coughing. They were immediately removed from the others, and put on dry hay diet and half an ounce of nitre was dissolved in a bucket of water, and left before them for a drink; they appeared dull in the afternoon, and died that night.

Examination of the carcass six hours after death, that of a full mouthed Madras ewe; the tissues about the throat were infiltrated with serum, and the opening into the larynx was closed by œdema.

Head.—There was much fullness of the veins of the skull and coverings of the brain, the brain itself appeared normal between the lateral ventricles, and at the base of the brain there were about 2 ounces of serum.

Thorax.—The lungs were fully expanded and greatly congested. The pericardium contained a small quantity of fluid. The cavities of the heart were greatly distended with dark blood, and the substance of the heart had a peculiar worn appearance, without a particle of fat about it.

Abdomen.—The stomach was distended with gas, and contained a small quantity of undigested food (grass). The intestines were inflated, tinged yellow, and had a peculiar crepitant feel. Liver was large, and the whole of the concave surface tinged deeply with a dark green color. There was no fat about the kidneys, which were of normal size. Bladder contained a small quantity of high colored urine.

The next day five others were taken ill with the suspicious swelling under the jaw. A purge of common salt was immediately given to each, and the swelling as well as the back of the neck was cauterized with the hot iron, from which they seemed better: the swelling disappeared, and they began to feed, but were still confined to dry fodder; on the fifth day they were suddenly seized with violent diarrhœa, and notwithstanding every variety of treatment, succumbed to the disease. Eighteen out of the twenty were thus destroyed in about three weeks. When treated medically, they recovered from the swelling in the throat, only to be carried away some days after by the fatal diarrhœa which at its close took on the form of dysentery.

I could make nothing of the disease; it seemed, as far as my ovine experience extended, to be the disease recognized by the farmers at home as the "rot." If the throat symptoms were not attended to, the animal died, apparently from suffocation; when on the contrary the swelling yielded to treatment, the animal was subsequently carried off by diarrhoea. This was generally preceded by listlessness, disinclination to move, and general debility. In some there was a slight muco-purulent discharge from the nostrils, and emaciation; eyes dull and glassy; conjunctiva sometimes congested, bowels costive at first, followed by violent purging, terminating in fœtid mucus stools, occasionally tinged with blood. Tympanitis, loss of cud or rumination, these formed the chief symptoms by which the disease showed itself, generally terminating fatally in from three to seven days from the appearance of the fatal swelling under the jaw. Perhaps it would be better to give as an illustration a case or two as treated by me.

Case I.—A Mysore cross-bred ram, aged 2 years and 4 months (2-toothed); a well formed animal.

15*th March.*—Was observed this morning to have a soft swelling under the jaw, of small size, but sufficiently large to be apparent at first sight. The ram was immediately isolated, and had one ounce of common salt with one drachm of powdered ginger, dissolved in about 8 ounces of rice conjee, and drenched; actual cautery was applied to swelling, and to the nape of neck.

Vesp.—The salt acted three or four times freely on the bowels, appears livelier, picks up and eats a blade of grass now and then.

To have a pint of rice gruel.

16*th.*—Decidedly better; swelling of jaw disappeared; is willing to graze, and to all appearance looking well; chews his cud freely, and goes about as if nothing is the matter with him. To have a tea spoonful of common salt every morning.

17*th March.*—Doing well. Continued.

18*th* „ Doing well. Continued.

19*th* „ Was seized during the night with purging; stools contain a good deal of mucus; animal evidently in pain, restless and thirsty.

To have one drachm of chalk with 5 grains of powdered opium, and one drachm of ginger, 6 ounces of conjee, night and morning.

Applied hot fomentations to abdomen.

Vespere.—Abdomen tympanitic; animal heavy and listless, lying down, cannot be roused. Pulse excited.

Continued drench. To have a turpentine enema now.

20*th*.—Died during the night.

Examination of the carcass, Head.—Much venous congestion about the membranes; vessels of the brains slightly gorged with blood.

Chest.—Cavities of the heart fully distended with dark loosely clotted blood; the substance of the heart pale and flabby; not a particle of adipose tissue present; fibres of the heart rough as if cleaned of their connective tissue with a scalpel. Heart itself of natural size; lungs healthy, posterior lobes gorged with dark venous blood.

Abdomen.—Stomach contained some conjee. General appearance of the intestines tinged yellow, and contained much mucus mixed with soft dung; coats of the intestines soft, with inclination to brittleness. Liver congested, of dark color, apparently of natural size. Gall-bladder distended with green watery bile. Urinary bladder empty and contracted.*

CASE II.—5*th April* 1864.—A yearling male lamb (cross between a Merino ram and Coimbatore ewe) was observed this morning to have a small soft swelling under the jaw, and to appear otherwise dull with disinclination to motion, loss of cud, and abdomen tumid.

The swelling was cauterized, and 2 ounces of castor-oil given at once, with a drachm of ginger in come rice conjee.

Vesp.—The bowels acted freely; in other respects much the same.

To have two drachms of laudanum in a pint of rice conjee.

6*th*.—Continues dull and listless, lying down; abdomen still tumid.

Applied hot fomentations to abdomen now, and to be repeated two or three times during the day. To have one drachm of laudanum with a pint of rice conjee, with a drachm of ginger powder three times during the day.

Vesp.—Much the same. Continued.

7*th*.—Moves a short distance and lies down, sometimes restless and uneasy; abdomen cauterized. Continued drench.

Vesp.—Much about the same. Continued.

8*th*.—Was seized during the night with diarrhœa; the stools are copious, offensive and watery, passing out in an involuntary manner.

To have prepared chalk, 1 drachm;
Opium, 5 grains;
Powdered ginger, 1 drachm.
mixed with a sufficient quantity of conjee every four hours.

Vesp.—Is evidently sinking.

9*th*.—Died during the night.

Examination of carcass.—Head not examined.

* Several larvæ of the *œstrus ovis* were found inside the nostrils of the animals examined.

Chest.—Lungs inflated, and the parenchyma infiltrated with serum; some congestion of posterior lobes. Pericardium contained the usual quantity of serum.

Heart large and distended with black jelly-like blood, and the substance having a pale wasted appearance without a particle of fat, and feeling flabby.

Abdomen.—Stomach empty. Intestines inflated, and of a yellowish tinge. Contained some fluid fæces intermixed with mucus. The mucus membrane congested, but the gut itself has an emphysematous feel. Liver large and congested, of a dark colour on its lower surface; kidneys small, and have a peculiar wasted appearance. Bladder empty, not a particle of adipose tissue visible in any part of the carcass. Almost the same *post mortem* appearances were present in every animal I examined.

As soon as the first few were affected, the others were all given a drachm of common salt each night and morning; this I had found an admirable plan in 1855-56 in the jungles of Orrisa, where the common country sheep were infested with the "Flukes" or *Fasciola hepatica* (*Distoma hepatica*); but here it proved ineffectual. In veterinary works the rot is attibuted to flukes, but in the animals I examined I found none, although I carefully looked for them, except in one instance, in which I found the *Hydatis Acephalocystis*, of which though fully formed, I could discover but the solitary one.

In 1856, whilst at Nagpore, I examined the carcass of a sheep sent me by Captain (now Major) Power, of the Judge Advocate General's Department, which was said to have died of diarrhœa, and from what I can now remember, the appearance of the dissections were exactly alike. What impressed the circumstance on my mind at the time was the distension of the cavities of the heart with dark blood. The treatment was varied; castor-oil purge was substituted for the common salt; nitre drinks were given and ipecac. Catechu and chalk, with and without opium, were used to restrain the diarrhœa, without effect; in one or two cases in which this object was attained tympanitis set in, stimulants in the shape of country arrack with rice conjee were tried with a few, but proved of no avail. The disease here described agrees in every particular with the description of the "rot" given by veterinary writers in general; recent writers trace the rot in sheep to the *cysticircus liveatus* and *termicollis*, but I found neither. This disease is well known in England, where it is, I believe, generally fatal. In Egypt it is extremely destructive, not only to sheep, but horses and cattle are said to suffer from it after the annual floodings of the Nile, and it is said to be readily recognized in affected sheep "by the presence of a bag full of water under the jaw," by which no doubt the swelling is meant. This, as Blaine states, is no great performance, for every carter in England could point it out when the dropsy had gained so great a head as to appear in so marked and visible a shape.—*Vide* "Blaine's Veterinary Art," 6th edition, revised by Mayhaw, 1854, page 372. In this he is right, for the natives here could do the same, and characteristically term it "*swelling of the head*"; but I think it would baffle the knowledge even of the most experienced in ovine diseases, to find any thing wrong with the animal before the appearance of this swelling; and even after

Read the following Proceedings of the Board of Revenue, No. 4503, dated 19th July 1864.

Read the following letter from J. Thacker, Esq., *Veterinary Surgeon,—(dated 12th July* 1864.)

I have the honor to acknowledge the Proceedings of the Board of Revenue, No. 3668, dated 16th June 1864, with enclosure, letter from G. W. McIvor, Esq., Superintendent, Government Cinchona Plantations, communicated for my remarks.

2. I beg to express my regret at being unable to arrive at any satisfactory conclusion without an opportunity of personally investigating the epizootic now raging in the hill districts.

3. In justice to the evident scientific knowledge and able observation shown in Mr. McIvor's views, I feel reluctant to comment without further acquaintance with them, and which I believe can only be obtained by a personal interview.

4. I regret that the symptoms and post-mortem appearances, as delineated by that officer, do not enable me clearly and satisfactorily to trace that exact type of murrain embodied in my report to the Government, though I have little or no doubt of its being one of the forms of the "rinderpest" or "steppe murrain."

5. I feel compelled to dissent from the opinion, that it is "pleuro-pneumonia," as the manner of attack, symptoms in the several stages, and progress essentially differ in the two diseases. In the post-mortem appearances there is a marked contrast. Mr. McIvor describes the lungs to be in an unnaturally distended and spongy condition and void of blood, whereas in true "pleuro-pneumonia" they are found to be "hepatised" (that is, become dense and solid in structure like the liver,) with portions of a dark-red colour, dependent on the super-abundance of blood contained in them; and the cut surface presenting a singular striated appearance like beautifully variegated marble, so characteristic of the disease that once seen cannot be mistaken.

6. Concerning the animalculæ represented as found in the blood of those animals which died of the disease, I regret more is not mentioned without which, having myself made no microscopic investigation, I fear to hazard an opinion. I believe it to be an entozoa of the filariæ species inhabiting the blood, and sometimes met with in healthy animals. It would be deeply interesting to make further investigation on this point, as the pathology of entozoic disease is but little known, and might possibly lead to important discoveries in this malady which has entailed such fearful loss in many countries, and formed a subject of deep study for many years to our most eminent scientific men without throwing much light upon its true nature or original cause.

7. On the suggestion of the internal administration as well as external application of turpentine, I can say but little, as I am not aware of its being used except in intestinal entozoa and filariæ found in the bronchu of the lungs. From my inexperience of its use in the present disease, I am unable to give any opinion on the advisability of its adoption.

Ordered to be communicated to Mr. McIvor through the Collector of Coimbatore.

2. The Board resolve to submit the papers to Government (who are already in possession of Mr. McIvor's letter), with the recommendation that Mr. Thacker's services be made use of for a further investigation into this cattle disease on the hills. The type appears to differ from that observed in Kurnool, but to be equally fatal.

3. The event is most momentous among pastoral tribes such as inhabit the hills, and in any case it is highly desirable that Mr. Thacker's observations should be as extensive and as minute as possible.

Orders passed by the Madras Government, No. 1432, *dated 9th August* 1864.

The Government have ascertained from Mr. McIvor that the disease has almost entirely disappeared. It would be of little use, therefore, to depute Mr. Thacker at present, but the collector of Coimbatore and Mr. McIvor will be requested to give Government immediate information of any recurrence of the disease.

Read the following Proceedings of the Board of Revenue, No. 4521, dated 19th July 1864.

Read the following letter from the Collector of Coimbatore, No. 145, *dated 8th July* 1864.

I beg to forward, for the information of the Board, a further communication from Mr. McIvor, Superintendent of Government Cinchonas, on the subject of the cattle disease on the Neilgherry Hills, with a request that the application contained in the latter part of his letter may be complied with.

From W. G. McIvor, Esq., *Superintendent of Government Cinchona Plantations, to the Collector of Coimbatore,—(No.* 104, *dated 6th July* 1864.)

I have the honor to acknowledge receipt of Proceedings of the Board of Revenue, No. 3668, enclosing report of Veterinary Surgeon J. Thacker on the cattle disease in Kurnool. This paper I have perused with much interest, and as it suggests some important points overlooked in my letter of the 4th ultimo, I trust I may be excused offering a few further remarks on the subject, as both the symptoms and effect of the disease prevailing here differ materially from the description given by Mr. Thacker.

2. In the first instance, here the disease has proved most fatal, on an average not more than one animal in fifty recovering. In the early part of August last, the disease broke out among the cattle of the Burgher villages of Ootchahully, Kirrapardoo, Mullagoorah, and Bickhutty on the Koondahs, and by the 15th of September it had destroyed the whole of the cattle of the village in which it first broke out; the disease proving most fatal where it first begins, and apparently becoming less virulent as

it proceeds; *secondly*, the animals were not at any stage affected costiveness or shivering fits; and *thirdly*, the cattle in the finest co dition were first attacked, while the less vigorous and healthy anim generally escaped the disease.

3. The preventive measures recommended in paragraphs 33 and of Mr. Thacker's report were adopted the moment the disease broke among my cattle, each animal being removed as it was taken ill, t separate house at a distance from the main stock. The house in wh the stock was kept being at once white-washed with fresh lime, fu gated with pitch, the floors swept and washed, and then covered w lime and fresh earth as the most convenient disinfectant, neverthe the disease was not in the least stayed, but on the following day anot was taken ill, and the succeeding day three more were seized; this fo the impression on my mind that the greatest error I had fallen int the treatment was having removed the sick, instead of the heal cattle, from the place where the disease was first contracted. I t took immediate steps to remove the healthy cattle, being careful to se only such as exhibited no symptoms of the disease, being guided in by the excrements showing perfect digestion. After the healthy ca were removed, only one calf was taken ill, when they were again instan removed, to another house, after which no further symptoms of the dise were shown.

4. From the above result I am convinced that had I taken precaution, in the first instance, to remove the healthy cattle instea the sick, that the greater part of them would have been saved, a would be glad to be favoured with the opinion of Mr. Thacker on point.

Ordered to be communicated to Mr. Thacker for his remarks.

Orders passed by the Madras Government, No. 1443, dated 11th August 186

Ordered to be recorded.

READ THE FOLLOWING PROCEEDINGS OF THE BOARD OF REVENUE, No. 50 DATED 6TH AUGUST 1864.

Read the following letter from J. THACKER, Esq., *Veterinary Surgeon, d 27th July* 1864.

I have the honor to acknowledge the Proceedings of the Board Revenue, No. 4521, dated 19th July 1864, with enclosure (further co munication from Mr. McIvor, Superintendent, Government Cincho relative to the cattle epizootic, and calling for my remarks).

2. The opinion expressed in paragraphs 1 and 2, I think it adv able to leave unnoticed until the opportunity likely to be afforded me personally investigating the disease in the hill districts, enables me form an opinion.

3. With reference to paragraphs 3 and 4, I think that the removal of apparently healthy animals from an atmosphere already tainted with the materies morbi might lead to a further spreading of the disease were those removed not kept under quarantine laws.

4. Such a measure as moving all apparently healthy animals from place to place on the occurrence of every new attack, would entail so much trouble and expense, and practically put a stop at certain seasons to all agricultural works, that I fear the difficulty and dissatisfaction likely to arise are considerations of grave importance before legal enactment be enforced, until the result of removing affected cattle become more known and reported to Government.

Ordered to be communicated to Mr. McIvor through the collector of Coimbatore.

Orders passed by the Madras Government, No. 1491, *dated* 18*th August* 1864.

Ordered to be recorded.

READ THE FOLLOWING PROCEEDINGS OF THE BOARD OF REVENUE, No. 7257, DATED 13TH NOVEMBER 1865.

Read the following letter from the Collector of Coimbatore, to the Acting Secretary to the Board of Revenue,—(No. 215, *dated* 17*th October* 1865.)

I beg to transmit copy of a letter addressed by me, I fear erroneously, to the Acting Secretary to Government, instead of to the Board of Revenue, informing him that Mr. Thacker's report on the cattle disease on these hills was expected in a day or two, and requesting instructions as to the future disposal of his services.

2. I have now the honor to forward in original Mr. Thacker's report on the disease, which appears to have been of a malignant type, but to have yielded at once to the treatment followed. This treatment, it is to be observed, was in accordance with the course indicated by Mr. Thacker, and which was published by order of Government some time ago in the District Gazette for general information.

3. In the present instance, the disease was evidently introduced from the low country, and it is probable, that had it not been at once checked, it would have been communicated to other cattle on the hills. Since Mr. Thacker's arrival on the hills, personal inquiries amongst the burghers lead to the conclusion, that there is now no "murrain" on them, and that there has been none for some nine or ten months; but it appears that within the last few months, a good many cattle have died from the effects of sore throat. This type of disease has now entirely disappeared.

From the Collector of Coimbatore, to the Acting Secretary to Government,—(No. dated 11*th October* 1865.)

I beg to inform you that Mr. Thacker has completed his inqui with regard to the cattle disease on these hills. His report on subject I expect to receive within a day or two; but, as I am to-day start in company with His Excellency the Governor to Melkoond some days must elapse ere I can forward it. I therefore write at once ask whether Mr. Thacker's services are to be dispensed with, or whet they may still be taken advantage of, in view to his making inqu about a disease which has of late prevailed to some extent amongst sheep in the low country.

From VETERINARY SURGEON J. THACKER, *to the Collector of Coimbatore,—d October* 1865.

I have the honor to forward you a report of disease occurr amongst the public cattle employed at the Lawrence Asylum works.

2. From the symptoms, and the post-mortem appearances the described, I believe the cases to be "murrain," such as witnessed by in Kurnool during last year.

3. The preventive measures adopted in the removal of the animals to an isolated shed, immediately the attack was obser appears to have been most effectual in preventing its further ravages.

4. Of the sixteen bullocks sent to Coimbatore all were not attack but five of the others became affected either by contagion or infecti thereby shewing its malignant character, and the importance isolation.

5. I am informed that the five cases occurring at the outbr were so rapid in their course, that four of them terminated fatally bef the nature of the disease was apprehended, and the remedies publis in the Gazette could be applied.

6. The thirteen cases subsequently treated were successful, w only one exception; a very old and debilitated animal.

7. The only variation of treatment, in the substitution of h lard for sulphur as a laxative, I consider of no moment; the latte more generally used, and has not the objection of the other on acco of caste prejudice.

8. I consider these cases afford the greatest satisfaction in showing *first*, the malignant character of the disease; *secondly*, the effect prevention of its extension by the simple plan of removing the sick fr the healthly, a point not universally concurred in last year; and *third* by its amenability to the plan of treatment suggested by me.

9. An interesting fact in connection with this outbreak of dise is that the native cattle owners immediately drove away their ca many miles distant.

Report of cattle disease occurring at the Lawrence Asylum Works, Neilgherries.

Statement showing the number of cattle attacked with "murrain" with the deaths and recoveries :—

Strength of cattle employed on the works.	Number attacked.	Number of deaths.	Number recovered.
38	18	5	13

The disease broke out amongst the cattle on the 29th of July last, and continued for a period of about five weeks.

Within the first fortnight of the outbreak five were attacked, and four fell victims to the disease in a short time, and one recovered. From the 18th to the 31st August, thirteen cases occurred in which Dr. Thacker's remedy was had recourse to; in four, the disease was happily checked in its early stage, and of the remaining nine, one died and eight recovered; the period of recovery from commencement of the attack, varied from one to three weeks.

The disease was generally known to have set in by the animal losing its appetite, which was soon followed by a heavy fit of shivering, the ears began to droop, and there was constantly an acrid discharge from eyes and nostrils; in some the white membrane (conjunctiva) of the eyes were very much injected, and the animal looked dull; in a few cases the bowels were relaxed from the commencement of the disease, while in others constipation was present, for which three drachms of hog's lard was given night and morning mixed with some ragi gruel, two or three doses of which were found to be sufficient in producing free action of the bowels, after which a strict attention to diet that consisted of ragi gruel night and morning, perfect rest, and a careful exclusion from the cold air, were the means adopted, which had a good effect in checking the disease in its early stage in four of the above cases, and the animals soon began to gain their strength, and were quite well in seven days. When the disease had advanced to that stage in which diarrhœa had set in, accompanied with much griping and straining, the motions consisted chiefly of mucus and blood, and highly offensive, the animal was found lying down from exhaustion with a very weak pulse. Dr. Thacker's powders, which were made up of camphor two drachms, datura one drachm, nitre and cherayata of each two drachms, were mixed up with four ounces of arrack, and given along with two quarts of ragi gruel twice a day, which was attended with marked good effect. In two cases the diarrhœa was completely checked after the fourth dose, and the animals regained their former strength in about nine days. In the other six, the period of treatment somewhat varied, from five to eight days elapsed before any improvement had taken place, but when it had once set in they steadily progressed, and in only two of the above have I noticed the diarrhœa to have advanced to such an extent as to call for the additional use of the opium and catechu powders, which were administered in doses of one drachm of the former to three of the latter, night and

morning; four doses of each of these proved sufficiently effectual, but their recovery was very tardy, about two weeks having elapsed before they showed any signs of returning health.

The death recorded under treatment took place in an animal that was previously in low condition from age, and it had no stamina whatever to contend with the disease.

Post-mortem.—The liver was invariably found congested, the gall bladder considerably distended with dark colored bile, the alimentary mucous membrane throughout its whole course was highly vascular, and in two cases the rectum was studded with ulceration.

During the attack the cattle were kept from work; the healthy were separated from the diseased, and they were shut up in a separate shed at night, the walls and flooring of which were regularly cow-dunged.

LAWRENCE ASYLUM WORKS;
LOVEDALE,
2nd October 1865.

J. ANDERSON,
Assistant Apothecary.

As to the probable cause of the outbreak, it would be as well to mention, that on the 11th July six pairs of bullocks were sent down to Coimbatore to fetch up some machinery, and two more left on the 19th to assist them; on their return on the 21st, they were certainly looking jaded, though not actually ill. One of them was attacked on the 29th, and died on the 31st, and from this period to the end of August cases occurred; thirteen of those attacked were amongst the cattle that had been down, four of which died. It is evident from this fact that the disease was contracted and brought up from the plains.

J. ANDERSON.

Mr. Thacker's report will be submitted for the information of Government. The Board congratulate Mr. Thacker on the success which attended the treatment adopted by him.

Orders passed by the Madras Government, No. 2937, dated 28th November 1865.

The Government learn that disease of a virulent type has recently appeared among cattle on the hills, and await Mr. Thacker's further report.

The Board will circulate the present papers extensively.

Read the following letter from the Conservator of Forests, to the Secretary to Government, Revenue Department, Fort Saint George,—(No. 1541, dated 10th January 1866.)

I beg to enclose a report received to-day from Major Morgan, as to the occurrence of the *Rinderpest* amongst the forest bullocks in the Sigur valley; the disease broke out on the 24th ultimo, and continued

till the 3rd instant. The result is that out of the herd of 150 bullocks, thirty-one were attacked, and twelve died.

2. The mode of treatment adopted accords in principle with that suggested by Mr. Thacker, Veterinary Surgeon, now on special duty in these hills, and also with the recommendation of two writers in the "London Evening Mail." Copy of one of these communications is annexed. The administration of chlorate of potash at the commencement, followed by diluents as gruel, and rice conjee, with opium in larger or smaller doses, seems to have been attended with favorable results in comparison with many recorded cases. I therefore forward the report for the information of Government.

From the Deputy Conservator of Mudumallai, &c., Forests, to the Conservator of Forests,—(No. 400, dated 9th January 1866.)

I have the honor to report to you, for the information of Government, that on the 24th of December murrain broke out amongst the forest bullocks at Musnicoil, and out of 150 bullocks thirty-one were attacked, of these twelve died and nineteen recovered.

2. Expecting that murrain would break out, I had ordered the cattle to Mudumallai on the 16th December, but a slight delay took place in consequence of the cattle being then engaged in carting timber to Ootacamund.

3. I had previously sent instructions for the treatment of sick cattle to all my overseers, consequently when the murrain first broke out, of the twelve bullocks attacked only five died.

4. I did not get the report that murrain had broken out till the 30th December, when I immediately proceeded to Mudumallai and inspected the cattle. I found the sick bullocks, seven in number, separated from the rest, and my instructions pretty fairly carried out. The bullocks almost refused all food, and were passing blood and mucus. I gave them rice conjee with four grains of opium, morning and evening, and of the seven then attacked three died and four recovered. I believe that if I could have been present when the disease first broke out, very probably not more than six would have died instead of twelve; but as it is, I think we have reason to be satisfied in having only lost twelve bullocks out of 150. I am not aware that any one else has been successful in the treatment of the murrain, whether in this country or in England.

5. The measures adopted were as follow: quarter of an ounce of chlorate of potash in a quart of water to all the bullocks as a preventive. On the bullock refusing his food he was separated from the herd, and half an ounce of chlorate of potash, dissolved in four quarts of water given, after which he might have grass and rice conjee. The dose was continued daily for five days, and then stopt for two days; if purging still continued, two more doses with rice conjee and four grains of opium twice daily. Five doses generally proved sufficient. I believe that the

preventive, in the shape of a quarter of an ounce of the medicine to each bullock, was of the greatest service, as from the date it was administered (January 2nd) not another case occurred.

Orders passed by the Madras Government, No. 233, dated 26th January 1866.

The Government believe that Mr. Thacker was at Ootacamund when this out-break of cattle disease occurred, and wish to know why his services were not sought on the occasion.

READ THE FOLLOWING PROCEEDINGS OF THE BOARD OF REVENUE, NO. 1845, DATED 16TH MARCH 1866.

Read the following letter from the Collector of Coimbatore, to the Secretary to the Board of Revenue,—(No. 63, dated Matoopollium, 9th March 1866.)

I beg to forward, for the information of the Board of Revenue, Mr. Thacker's Report on the outbreak of cattle disease or rinderpest on the Neilgherries, and of the measures and treatment adopted by him to arrest it.

2. The report is so full and exhaustive that any remarks on my part are unnecessary.

From personal inquiries amongst the people in different parts of the district, I learn that the cattle disease has been well known for many years. In some parts of the district it is called the "great or deadly disease," and in others "small-pox."

3. Outbreaks of the disease during the hot months are said to be far more deadly than in the wet season. Cooling drinks and mashes, if given in its early stages prove at times beneficial; but if it has been allowed to gain head, they are perfectly useless, and no remedies to arrest its progress are known.

REPORT.

INTRODUCTION.

In accordance with orders of Government, dated 14th September 1865, No. 2214, I proceeded to Ootacamund to investigate the nature of the cattle disease, which the collector of Coimbatore reported to be existing on the Neilgherry Hills.

2. On my arrival I ascertained that the epizootic had for the time ceased, the Apothecary at the Lawrence Ayslum site having treated successfully, on the plan I recommended, the cattle that were attacked there; details of which, with the general result of my inquiries into its nature and virulence, were forwarded to Government, through the collector of Coimbatore, and afterwards published in Miscellaneous Circular, No. CLXXI., of 18th December 1865.

3. At the request of Mr. Grant, I remained at Ootacamund until a reply had been received from Government, to a reference made for my further services in inquiring into the nature of a disease that was reported to have broken out among the sheep of this district.

4. Before, however, an answer was obtained, the cattle disease again appeared on the hills, and with the concurrence of the collector, I proceeded at once to adopt such measures as I deemed necessary to endeavour to subdue it, and to prevent its spread.

5. The attack, which was short and virulent, and confined chiefly to the cattle in and around Ootacamund, and to villages within a radius of five or six miles from it, subsided finally about the middle of January 1866. Full particulars, with the successful method of treatment, by which nearly fifty per cent. of those attacked were saved, are hereafter given. (See Appendix B.)

6. At the end of January I proceeded to the Bowany Talook, where the disease was reported to prevail; but on arrival there, finding my services were happily not required, either for this, or for the disease among the sheep, I returned to Coimbatore, after giving such general directions and advice, in case of a further outbreak, as I thought would be intelligible.

7. I then proceeded with the collector to the large grazing grounds near to Gopaneiry, but without having an opportunity of seeing more of the disease, and have only now to record the results of my inquiries into, and treatment of, this malady, which I believe to be the true form of "rinderpest," as now prevailing in England.

HISTORY OF THE RINDERPEST.

8. The herds on the Neilgherry Hills have been periodically attacked by it, but no definite information as to the exact time of its appearance was to be obtained. The concurrent testimony, however, of the different hill tribes is to the effect, that it was not known, until Ootacamund was made a European settlement; thus giving rise to the conjecture that increased communication with the plains may have been the cause.

9. That it is not of a very recent introduction is evident by the fact of the appreciation by the Todas and Badaghars of its formidable nature, and of the sagacity and promptness with which they endeavour to overcome its destructive powers, by at once establishing a rigorous quarantine in any village where it is known to exist, and by breaking up large herds into small detachments, which are kept as far separate as possible.

10. These preventive measures are promptly taken, but as far as I could learn, the animals are not medicinally treated, and though I personally endeavoured to persuade a Badaghar, who had lost eighty head of cattle from this cause, to make use of the medicine in the cases he then had attacked, he refused, having lost faith in it, on account of

the unsuccessful application in two cases, of some that had been pr viously sent out to him through the Tahsildar; but in the prelimina measures of segregation, the hill tribes are far in advance of their brethr in the plains, who do not seem to care to adopt so simple a precaution.

11. The first recorded information is to be found in the repo of Mr. McIvor, (Proceedings of the Board of Revenue, dated 16 June 1864, No. 3668,) wherein he describes the epizootic that prevail in 1864 among his own cattle, and among the herds of many of th villages of the Neilgherries and Koondahs, to be "pleuro-pneumonia of a virulent type, so much so, that on the average not more tha two per cent. of those attacked, recovered; and by which visitation was said many large cattle-owners among the Todas and Badaghars we reduced from wealth to comparative poverty.

12. The symptoms and pathological appearances were certainly those of "pleuro-pneumonia," as I have already stated in my letter Government, 12th July 1864, Proceedings of the Board of Revenu dated 19th July 1864, No. 4503; I then entertained the stronge suspicions that it was the true form of "rinderpest"; these we subsequently confirmed on my shewing to Mr. McIvor the dissect body of an animal that had died of the latter disease on the 20 December 1865, when he admitted that the cattle which died in t visitation of 1864 exhibited exactly a similar appearance.

13. In my report of 1864 I added, as an Appendix, a sho description of the disease, and mode of treating it, intended to within the comprehension of the ryots, but a further and more detaile account is hereunder given.

CAUSE OF THE DISEASE.

14. Of the proximate cause of the disease I can say nothing; am, however, inclined to believe that atmospheric influences are at work as evidenced by the simultaneous outbreak and cessation of the disease in places remote from each other. Once the disease is generated there is no doubt that it is eminently contagious. In illustration of this I record an instance which came under my own observation in December last, when attending a case in Ootacamund; I advised the proprietor to separate carefully his healthy cows, of which he had four or five, from the sick one, on which he sent one which was not giving milk, to a relative some miles distant, who kept a herd of 120, all apparently in perfect health. The sick cow died, but the one sent away, and the others that were kept separate at Ootacamund, never exhibited any symptoms of disease, but within one week of the introduction of the strange cow, the bull of the herd, who had first noticed her, died; and within a fortnight or so of that time, seventy had been attacked out of the 120 of which twenty-two cases terminated fatally.

15. The disease in this case was probably communicated to the herd by the strange cow, carrying in some manner the infection in her hide, but which, having no influence on herself, caused such destructio to others.

16. The excreta are also I believe a potent agent in the spread of the epizootic. Healthy animals being driven along roads or over pasture grounds previously visited by those diseased, smell the fæces, and thus become infected: besides, the dung of the sick may be used by the natives to smear the floor and walls of cow-sheds inhabited by healthy cattle; in which way may be explained many isolated outbreaks of the disease.

SYMPTOMS.

17. The first marked sign is a peculiar spasm of the muscles of the front of the chest and neck, sometimes also of the hind-quarters. This is apt to be mistaken for shivering, which not unfrequently accompanies or succeeds it. Rumination ceases, and in cows the secretion of milk is stopped; the coat stares, the ears droop, the back is arched, the hind legs standing under the body. In the early stage, the temperature rises to 105° falling to 88° as debility becomes marked. The pulse is at first but little disturbed, but with the development of the disease it rises to a hundred or more, becoming smaller and weaker in tone. Respiration is somewhat quickened, and when the respiratory muscles become involved in the spasm already noted, is labored, but is not otherwise affected.

18. Differing from what I observed in Kurnool, there was, in most cases, very little mucous discharge from the eyes and nose. The bowels at first constipated, afterwards became relaxed, followed by a most fœtid watery purging, and as the disease approaches a fatal termination small evacuations of green mucus mixed with blood are passed. The disease proved fatal in from twenty-four hours to eight days.

19. When an animal began to progress towards recovery, the first sign indicative of improvement was an increased quantity of fæculent matter in the evacuations, which gradually assumed a more consistent character, the pulse became softer and fuller, then the appetite began to return, the warmth of skin became natural, and lastly, rumination began, and in the cow the secretion of milk returned.

PATHOLOGICAL APPEARANCES.

20. The pathological appearances are principally confined to the digestive mucous membrane.

21. The back part of the mouth, fauces, and pharynx present a dark red congested appearance with occasional "echymosed" effusion of blood under the skin spots, and small superficial ulcers; the mucous membrane of the larynx has a similar appearance, and the trachea is slightly heightened in color.

22. The esophagus, rumen, and reticulum are healthy. The rumen is remarkably full of food of a natural appearance, the omasum is full of hard dry food, but its structure is generally healthy; sometimes the mucous membrane peels off readily.

23. The most striking character is in the abomasum or true stomac which presents, in some places, a dark purple appearance, and, in othe a dirty grey or brown, with small spots of black pigment scattered ov its entire surface; here and there are small spots of superficial ulcerati rather less than quarter of an inch in diameter.

24. The small intestines have a similar character. The anter part or duodenum is similarly congested, and in addition has occasion yellow patches of exuded lymph. These patches are attached by th centre to the mucous membrane, the circumference being loose; wh removed, the portion of the mucous membrane to which they have be attached, is either highly congested or ulcerated. The middle part jejunum is less affected.

25. The posterior part or ileum presents less general congestio but is to a greater extent, even than the duodenum, covered with patch of exuded lymph, concealing ulceration. These increase in number the cæcum is approached. They are quite superficial, in no case pe trating the mucous membrane. There are also at intervals patches black discoloration surrounded by inflammatory congestion; this seems be caused by a deposit of pigment.

26. The cæcum or commencement of the large intestine sho the ulceration in its greatest extent, almost its entire surface being co verted with them. From this point it gradually diminishes, and t rectum is generally healthy.

27. The liver is healthy, the gall-bladder is generally distended and its mucous surface sometimes shows an appearance similar to that o the cæcum.

28. The blood contains less fibrine than usual, being seldom found coagulated, except occasionally in the right ventricle. Its color was natural, and there was no perceptible diminution in the number of the blood corpuscules.

29. Although many specimens of the blood of diseased animals were examined by myself and others, microscopically, both immediately after the death of the animal, and after the blood had been exposed for several days, no trace of animalculæ could be observed. As this was one of the points brought to my notice in Proceedings of the Board of Revenue, No. 3668, dated 16th June 1864, with letter from Mr. G. McIvor, Superintendent, Government Cinchona Planta- tions, after we had failed to discover the animalculæ, I requested Mr. McIvor to join me in further investigation: this he did, but also failed to point them out. I had previously been supplied by Mr. McIvor with the glass slides, containing the supposed animalculæ, from which the drawings in his letter were taken. The objects therein shown do not present any of the ordinary appearances of animalculæ, but more those of vegetable fibre.

30. Occasionally the serous membrane lining the interior of the heart was of a dull red color, with echymosed spots near the origin of the pulmonary artery. The portion of the pericardium lining the heart showed dark red spots over its entire surface.

31. The lungs were sometimes emphysematous.

TREATMENT.

32. The treatment may be divided into, *first*, preventive; and *second*, curative.

33. Preventive. *Vaccination.*—I regret I had no opportunity of trying the effects of this as the probability of its doing good was not brought to my notice till a late period in the epizootic and from the difficulty of obtaining fresh vaccine matter. I think it desirable that the first opportunity should be taken of instituting experiments in regard to it, especially as the present opinion in England is that the disease is a form of variola, and in the "Economist" of 13th January, several instances of its successful application have been recorded.

34. II. Inoculation.—Matter was obtained from an ulcer in a decided case of rinderpest, and inserted under the skin inside of the arm and thigh of three healthy animals, a buffalo cow, and two heifers; the former had the disease developed on the second day, and succumbed to it on the fifth day.

35. One of the heifers appeared to have a disturbed condition of the system from the second to the twelfth day, after which complicated symptoms set in, and she died on the sixteenth day. The *post-mortem* examination showed that the disease had existed, but was not possibly the cause of death.

36. The third animal had the disease on the eighth day, culminat- ing on the ninth, from which date she gradually recovered, and was discharged cured on the twenty-second day.

37. The record of the symptoms with the daily remarks is append- ed (Appendix A), but it is to be observed that these animals were not medicinally treated, it being thought advisable to allow the disease, as an experiment, to run its course.

38. This, however, was too limited to allow of any data being deduced for general guidance, and it may perhaps be thought advisable that a further trial should be made. I am, however, inclined to the opinion I formerly held, *viz.*, that the danger of dissemination by inocula- tion is scarcely to be counter-balanced by the possible advantage of pro- ducing the disease in a milder form in the animal operated on.

39. III. Separation.—The importance of this is so undoubted, and has already been so fully referred to in my previous Report, that I do not consider it necessary to enlarge upon it here. The present Act, founded on such suggestions, if properly carried out, will do much to prevent the future spread of the disease.

40. IV. Cleanliness.—This is a point of the greatest import- ance, and could it be fully impressed on the native mind, an outbreak of the epizootic might often be prevented, and certainly the primary virulence of the disease might be considerably mitigated. The cattle- sheds should be cleaned out several times a day, and the excrement buried.

41. I would suggest that great care should be taken to prevent the natives smearing the floors and walls of the cattle-sheds with the dung of diseased animals; indeed, in opposition to my former recommend-

ation, I would suggest that the use of cow-dung should, in seaso epizootic, be entirely prohibited, and that mud or lime should be al used.

42. I. Cure.—Camphor, nitre, datoora, cherayta, arrack, op and catechu I continued to use, as recommended by me in my prev Report, and my success was such as to confirm my previous opinion of efficacy; the proportion of cures was not so great as before, yet that be accounted for by climatic and other influences. Table B of the App dix shows the result of this treatment.

43. II. Vapour Bath.—Three cases were subjected to this tre ment, of them two recovered, and one died; in one case of recov however, I am not certain that the result was altogether due to the vap bath, as before using it the animal appeared to be improving.

44. My experience has been too slight to enable me to form opinion, but I would be disposed to give it a further trial, were pr appliances available. I do not think, however, that it will eve generally adopted by the agricultural population, owing to the diffic attending its application. A detail of these cases will be found Appendix C.

45. III. Chlorate of Potash.—Having observed that the use this salt was recommended in an English Journal, on theoreti grounds, I tried it in two cases, but both animals died, the medic appearing to exert no effect on the progress of the disease.

46. IV. Condy's disinfecting fluid.—This was tried in co junction with other medicines, and, as an adjunct, I believe it to useful.

CONCLUDING REMARKS.

47. In the foregoing portion of this Report, the history of the la epizootic has been given in detail. It now only remains to state wh means should be adopted in any future outbreak.

48. On the receipt of the information, an officer should be d spatched to the spot, to see that the terms of the Act relating quarantine, &c., are properly carried out, the village herd should, practicable, be broken up into manageable detachments, and the sic carefully separated from the healthy. Cleanliness should be strict enforced, the excreta buried, and the use of cow-dung in cleaning cattl sheds for the time prohibited. The bodies of such animals as die of t disease, should be buried, with their hides on, in an enclosed space, so to prevent the approach of healthy animals. For the animals sufferin from the disease, the general line of treatment, recommended in m former Report, and published in the local Gazettes, should be followed.

Coimbatore,
2nd March 1866.

J. THACKER,
Veterinary Surgeon.

APPENDIX A.

INOCULATION.

Case I.—Buffalo Cow.

Dec. 9th.—Having the animal thrown down and properly secured, made an incision with a lancet through the skin, on the inside of the arm and thigh, in the neighbourhood of the large absorbent vessels; a portion of lymph from an ulcer of a decided case of rinderpest was inserted, and the incisions closed by thread sutures.

" 10th.—Slight constitutional disturbance, animal feeding.

" 11th.—Pulse 76 and hard in character, temperature of body 101°, considerable swelling around the wound on the arm, and very great pain in the hind leg, the animal holding it in the air, anxious countenance, evacuations normal.

" 12th.—Evidently suffering very great pain in the hind leg, pulse 88, small and wiry, temp. 101½°, nose dry and hot, fever present, bowels purging, but not of a diagnostic character. Remove sutures.

" 13th.—Died. Post-mortem appearances. The abomasum, small intestine, cæcum, and anterior portion of color highly congested, with some few of the characteristic yellow lymph spots covering either inflammation or distinct ulceration. The exterior of right ventricle of the heart echymosed, and internal lining much congested. The inoculated wounds of a dark dirty color, fœtid odour, almost gangrenous in character.

Case II.—Black and White Heifer.

Dec. 9th.—Inoculated inside arm and thigh with lymph taken from an ulcer of a case of rinderpest.

" 10th.—Pulse 60, with good tone, appetite good, evacuations healthy.

" 11th.—Pulse 80, temperature 101°, no diagnostic symptoms, appetite good.

" 12th.— Do. do. do.

" 13th.—Pulse 76, temperature 102°, do. do.

" 14th.—Pulse 88, temperature 103½°, do. do.

" 15th.—Pulse 100, temperature 105,° feeding, evacuations normal, no diagnostic symptoms.

" 16th.—Pulse 78, temperature 97°, no other change.

" 17th.—Pulse 72, " 97° do.

" 18th.—Pulse 74, " 99° do.

" 19th.—Pulse 96, " 100° do.

" 20th.—Pulse 84, " 100° do.

" 21st.—Pulse 92, " 100° do.

" 22nd.—Pulse 86, temperature 100°, observe slight foaming at the mouth, but cannot see any cause on examination.

" 23rd.—Pulse 92, and only to be felt at the heart, throat much swollen, tongue pendulous, and excoriated on its under surface; partakes of no food, incapable of drinking on account of the swelling. Tongue freely lanced, and hot fomentations used.

" 24th.—Pulse 115 and weak, countenance anxious, great prostration, labored respiration, swelling of throat extending downwards, can neither eat nor drink; continue hot fomentations.

" 25th.—Died. Post-mortem appearances. Acute inflammation of the pharynx and larynx, extending a little down the trachea, surrounding tissue filled with infiltrated serum, sufficient to have caused suffocation. The abomasum and cæcum have faint traces as of healed ulcers, there is no pigmentary deposit.

Case III.—Red Heifer.

Dec. 9th.—Inoculated from rinderpest lymph, under the skin, on inside of arm and thigh.

" 10th.—Pulse 70, temperature 29°, feeding.

Dec. 11th.—Pulse 88, temperature 101°, feeding.
„ 12th.— „ 76, „ 102°, do., remove sutures.
„ 13th.— „ 78, „ 102°, do.
„ 14th.— „ 80, „ 103°, do.
„ 15th.— „ 87, „ 103°, appetite moderate.
„ 16th.— „ 100, „ 102½°, do. better.
„ 17th.—Pulse 110, small, temperature 97°, nose dry, tremor, appetite indifferent, bowels purged mixed with the characteristic mucus of rinderpest, support well with gruel and keep warm.
„ 18th.—Pulse 111, with better tone, temperature 98°, appetite slight, evacuations fluid slightly streaked with blood.
„ 19th.—Pulse 98, good tone, temperature 98°, bowels passing more healthy fæcal
„ 20th.—Pulse 84, temperature 100°, bowels normal, appetite returning.
„ 21st.— „ 80, „ 99°, feeding, bowels healthy.
„ 22nd.— „ 74, „ 98°, do.
„ 23rd.— „ 68, „ 99°, do.
„ 24th.— „ 64, „ 100°, do.
„ 31st.—Discharged.

APPENDIX B.

SUMMARY OF GENERAL TREATMENT.

Number.	Period of treatment.	Result.	Number.	Period of treatment.	Result.
1	8 days.	Died.	34	6 days.	Cured.
2	1 „	Do.	35	1 „	Died.
3	3 „	Do.	36	6 „	Cured.
4	2 „	Do.	37	3 „	Died.
5	1 „	Do.	38	4 „	Do.
6	7 „	Cured.	39	4 „	Do.
7	8 „	Died.	40	5 „	Do.
8	5 „	Cured.	41	5 „	Cured.
9	4 „	Do.	42	9 „	Do.
10	4 „	Died.	43	2 „	Died.
11	5 „	Cured.	44	8 „	Cured.
12	4 „	Died.	45	3 „	Died.
13	3 „	Do.	46	7 „	Cured.
14	3 „	Do.	47	7 „	Do.
15	6 „	Cured.	48	8 „	Do.
16	5 „	Do.	49	7 „	Died.
17	7 „	Died.	50	7 „	Do.
18	6 „	Do.	51	3 „	Do.
19	3 „	Do.	52	8 „	Cured.
20	7 „	Cured.	53	2 „	Died.
21	12 „	Do.	54	8 „	Cured.
22	7 „	Do.	55	4 „	Do.
23	1 „	Died.	56	18 „	Do.
24	6 „	Do.	57	2 „	Died.
25	1 „	Do.	58	9 „	Cured.
26	3 „	Cured	59	4 „	Do.
27	5 „	Do.	60	14 „	Do.
28	4 „	Died.	61	3 „	Died.
29	4 „	Cured.	62	5 „	Cured
30	4 „	Died.	63	2 „	Died.
31	3 „	Cured.	64	7 „	Cured.
32	2 „	Do.	65	3 „	Died.
33	1 „	Died.			

Mode of treatment.	Number of cases.	Died.	Cured.
Total of usual treatment	65	34	31
„ inoculated	3	2	1
„ by Chlorate of Potash	2	2	0
„ by vapour bath	3	1	2
Total	73	39	34
Percentage	...	53·42	46·58

APPENDIX C.

VAPOUR BATH.

CASE I.—BUFFALO COW.

Dec. 8th.—Reported to have eaten only portion of morning feed, cessation of milk, pulse natural, evacuations healthy. Place in vapour bath temperature 106° for a half hour.

„ 9th.—No further development of disease, pulse natural, nose dewy, appetite moderate; repeat vapour bath, temperature 120°.

„ 10th.—Appetite good, increased secretion of milk, repeat vapour bath 120°.
„ 11th.—Vapour bath 120°.
„ 12th.— „ „ 110°.

„ 13th.—Milk freely secreted, no symptoms of ailment. Discontinue bath and keep under observation.

„ 20th.—Discharged.

CASE II.—RED HEIFER.

Dec. 3rd.—Pulse 80, bowels slightly costive, rigors, and spasm of neck, give sulphur 4 ozs. with datoora mixture and Condy's fluid.

„ 4th.—Pulse 96, fœtid watery evacuations, no appetite; repeat datoora mixture with Condy's fluid. Support with gruel.

„ 5th.—Pulse 88, softer and fuller, has passed a portion of intestinal mucous membrane, on the surface of which are the characteristic specks of congestion approaching to ulceration. Medicine repeated. Place in vapour bath.

„ 6th.—Has eaten a little food, pulse 80, soft and full, bowels passing more fœcal matter. Discontinue medicine. Repeat vapour bath 121°.

„ 7th.—Appetite steadily improving, pulse 66, nose dewy, bowels less purged; repeat vapour bath temperature 112°.

„ 8th.—Convalescent. Repeat bath daily.
„ 11th.—Discontinue bath.
„ 20th.—Discharged.

CASE III.—BRINDLE BULL.

Dec. 5th.—Reported eating indifferently, pulse 58, full and soft, bowels natural, spasm of neck; place in vapour bath 95°, for half an hour. No medicine.

„ 6th.—Pulse 66, soft and full, appetite slight, commenced watery purging; vapour bath 121°.

„ 7th.—Pulse 102, small and weak, purging watery, eats nothing; vapour bath 112°, support with gruel.

Dec. 8th.—Pulse indistinct, breathing labored, purging violent, partial insensibili vapour bath 106°.

" 9th.—Died. Post-mortem appearances. General congestion of mucous mem branes, glands on sides and base of tongue ulcerated; fauces, laryn pharynx, and upper half of trachea congested; lungs emphysemato slight echymosis at base of pulmonary artery; blood coagulated right ventricle only; abomasum, duodenum, cæcum, anterior of co and mucous lining of gall-bladder highly congested, and covered wi innumerable ulcers.

Coimbatore, 2nd March, 1866. }

J. THACKER, *Veterinary Surg*

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1. Ordered to be submitted for the information of Governme and that copies be furnished as follows :—

To all Collectors.
,, the Inspector General of Hospitals.
,, the Commissary General.
,, the Sydapet Farm Committee.
,, the Superintendent, Government Stud, Oossoor.

2. The Board recommend that Mr. Thacker be requested to w the experiment now making on the hills as to the efficacy of vaccin as a prophylactic in these cases, and to report the result.

3. It is highly desirable that this suggested remedy should thoroughly tested.

4. The collectors should endeavour to impress on the ryots primary importance of segregation, when the disease shews itself, special cleanliness and the use of disinfectants as lime, charcoal, &c., the byres, and that all diseased carcasses be effectively buried with hides.

Orders passed by the Madras Government, No. 826, dated 11th April 1866.

Mr. Thacker's report will be laid on the Editor's Table, and p lished in the Fort Saint George and District Gazettes in English the Vernaculars. Orders will shortly be passed, with reference G. O., 19th ultimo, No. 675, regarding his future proceedings.

Read the following Proceedings of the Board of Revenue, No. 3517, D 19th May 1866.

Read the following letter from the Sub-Collector in charge of North Arcot, to Secretary to the Board of Revenue,—(No. 110, dated 4th May 1866.)

In reply to the Proceedings of the Board of Revenue, No. 21 dated 26th March last, enclosing order of Government, Revenue Dep ment, dated 9th ultimo, No. 815, I have the honor to report, that particulars regarding the disease called "Vakkai" have this day forwarded to Mr. Thacker; copy of the same information is enclosed

TRANSLATION.

Memorandum *describing the manner in which cattle are attacked with the disease called Vakkai, and the remedies applied to remove the same.*

Question.—How does the disease called Vakkai originate?

Answer.—The condition of cattle, when attacked with the disease, is as follows: Hairs stand erect, the ears incline downwards, dislike for food. All this continues for a day or two, when the belly swells and purging begins. Excessive thirst; then dysentery comes on, the discharges being for the most part of a yellow color. Death ensues three to five days after purging begins. The disease appears to be a contagious one.

Q.—Describe how the cattle suffer before death?

A.—The day they are attacked they become rather weak. They at last become powerless, and cannot rise after purging. Rumination ceases. The urine becomes red, water comes out of the mouth in bubbles; also from the eyes and nose. After a great struggle, death ensues.

Q.—What are the remedies applied to remove the disease?

A.—The ryots and others suppose that excessive heat is the cause of the disease.

The following are given to cattle :—

1. Plantain fruit mixed with ghee.

2. Onions, palmyra jaggery, and plantain flower pounded together.

3. Sour rice water in which the bark of a tree, called "Perumar," after being pounded up, is put to be soaked.

4. The juice of a plant, called "Mayermanikum," diluted with water and with buttermilk mixed in it. The juice is given to the cattle immediately after it is thus prepared, so that it may not be spoiled.

5. Pigs' ghee.

6. The leaves of a plant called "Pillanji" triturated with pigs' ghee.

7. Turmeric powder with ghee is applied to the tongue.

8. "Chottookattayi," a species of aloes, is split and given to buffaloes with salt powdered put in it.

In order that the disease, when it makes its appearance, may not spread to other cattle, pigs' ghee is given to all of them at once.

These remedies prove partially successful. The hairs beginning to lose their erect position, and abatement of purging are sure tokens of recovery.

Q.—Does the disease now prevail in any of the villages?

A.—Yes. It prevails in the villages of Nelvoy, Pungalatt Kaniemboddy, Palatoovannan, Kanikanta, Moonjoorput, and Alam loomungapooram.

PILLAI MOOTOO PILLAI,
Acting Tehsildar.

(True translation)

ALLAPOORUM,
27th April, 1866.

R. W. BARLOW,
Sub-Collector in charge.

Submitted for the information of Government, with reference their order quoted by the collector.

Orders passed by the Madras Government, No. 1317, dated 1st June 1866.

The Government request that the Board will instruct the col to send specimens of the plants Perumar, Mayermanikum, Pillanji Chottookattayi, mentioned as remedies, to the Professor of Botan Madras for identification.

MEMORANDUM FROM THE OFFICIATING PRINCIPAL INSPECTOR GENERAL, MED DEPARTMENT, No. 177, DATED FORT SAINT GEORGE, 19TH MAY 1866.

From the General Superintendent of Vaccination, to the Secretary to the Princi Inspector General, Medical Department,—(No. 241, dated 15th May 1866.)

I have the honor to forward, for submission to the Principal spector General, a report on some forms of cattle disease I found valent on the Shevaroy Hills, during the month of April last.

Remarks on Cattle Disease, as seen at Nagalore and Yercaud, on the Shev Hills, during the month of April 1866.

It happened that a pestilential outbreak occurred among se herds of cattle at Nagalore on the Shevaroys, and being myself in neighbourhood at the time, on a temporary visit, during the ea vacation, and having heard so much lately of the notorious ca murrain that has been raging for some time in England, I was led to t an interest in the subject; and finding further, on enquiry amon the natives, that the term *Ummay*, or small-pox, was given to this dis by them, I became curious to learn its precise nature, and determi to embrace this opportunity of investigating it.

2. Previous to seeing the disease myself, I got the best account of it from the native herdsmen, or Malayalees, as they are called, from several of whom I elicited information; their description of it agreed singularly even to details. It may be briefly stated as follows:—

3. The animals, they said, were first attacked with a strong fever, which usually lasts three days; the coat becomes rough and stares; a few pimples now appear, and then a violent diarrhœa sets in, which destroys the animal generally between the fifth and ninth days. The purging, apparently the most peculiar feature of the disease, consists in the earlier stages of a greenish, offensive smelling liquid, which, the herdsmen remark, is ejected from the anus with some force; in the course of from 48 to 72 hours the dejections become extremely fœtid, and assume a darkish or bloody color; as the disease advances, tubular casts of mucous membrane are passed, which the natives imagine to be portions of the gut itself, for so they described it. When once the motions are noticed becoming dark and bloody, they abandon all hope of the animal's recovery.

4. The first opportunity I had of witnessing this disease, for myself, happened on the 2nd of April, when hearing from Captain Short that his cattle at Nagalore were attacked, and that twenty of them had already died from it, I proceeded thither in company with that gentleman.

5. The first objects that met our eyes on arrival at the cow-shed were two animals lying dead; one a two-year bull, the other a female, about eighteen months old, and lying almost 'cheek by jowl'; with these carcases were two tender-aged calves, neither of them more than a fortnight old. Having some vaccine lymph at hand, it occurred to me to try what effect vaccination would have, and with this object in view, I then and there inoculated these two calves, taking the virus from the arm of a subject. The effect of this procedure will be noticed in a subsequent part of this paper.

6. I now had the bodies of the dead animals removed to the shade of a neighbouring tree, and commenced a *post mortem* inspection, which was performed 'secundem artem' in the presence of Captain Short. The appearances observed were as follow:—

I. *Carcase of a two-year old bull.*—Carcase emaciated, with abdomen immensely distended (tympanitic), eyes glassy, lids open, tongue hanging out, throat swollen; passing the hand over the skin it imparted a roughness to the feel, as if small grits were beneath it; about the lower part of the abdomen, groins, and inner parts of thighs, patches of discoloration or ecchymosis of a crescentic shape were observed, and adhering about the anus and tail was some liquid fæces, indicating that the animal had suffered from diarrhœa. On flaying the skin, I was surprised to see the great vascular turgescence not only of the skin, but of the subcutaneous tissues also, in patches intensified to a degree such as I never remember witnessing before; holding up a portion of the flayed skin to the light, these crescentic shaped patches deeply seated in the tissues were rendered vividly distinct. The mouth and tongue were of a pale anæmic appearance, the mucous lining of the larynx and windpipe was

lightly injected and slightly rugose throughout, and there was consid able serous infiltration of the subcutaneous tissues and enlargement the cervical glands.

Chest.—The lungs were found emphysematous, and apparent healthy; the cavities of the heart were greatly distended with dark jel like, coagulated blood.

Abdomen.—On opening this cavity a quantity of gas escaped, givi out a most offensive sickening stench; the intestines lay loose and flab and at first sight presented nothing of disease about them; the paun contained some coarse stubble in an undigested state; the reticulum w half filled with a similar stuff in a much finer state of disintegratio this organ, when emptied of its contents and washed, presented an inflam appearance about the central part of its mucous lining; on scrapi away the superficial layer of epithelium with the back of the knife, t membrane was found intensely red; this redness existed in an exaggera degree in the third stomach or omasum, which was firmly contracted o some dry, hard, caked mass of food; in the obomasum or fourth stom a quantity of bilious stinking fluid was found; the mal-odour emitted opening this portion of the viscera, was extreme, and the mucous m brane of this organ was most deeply red and vascular, evidently from travasation of blood between its tissues. There was also, more or l congestion of the mucous membrane throughout the small intest more especially in the ileum, which was interspersed with claret-colo patches, visible externally, while its interior presented the same infiltr ed appearance, but nowhere could I detect any ulceration. The li had a somewhat darker appearance than natural, and the gall bladd was distended to a full size goose's egg, with green viscid bile. Urina bladder contracted and empty. I regretted much that I had no faciliti for examining the nervous system.

Carcase No. II.—This carcase, as already stated, is that of a cow calf, with emaciated trunk and distended abdomen. When the carcas was first seen in the *puttee* or shed, the head and neck were foun doubled under it; the external surface presented much the same appear ance as that detailed in the case above, the skin and subcutaneous tissue in this carcase also were remarkably congested.

Abdomen.—A similar stinking fœtor was given off on opening th cavity; the paunch was half filled with broken coarse grass, and the was slight turgescence of the mucous membrane; the reticulum wa nearly empty, and the mucous membrane in parts could be peeled o with the greatest facility by the fingers, leaving behind an inten redness of the substance below; the omasum contained some offensiv pulpy mass of a palish green color, with patches of congestion interspersed over the viscus; the obomasum had a quantity of claret-colored stinkin fluid of a sizey consistence, which exhibited indications of containing mixture of grumous blood. Several feet of the lower portion of th small intestines were of a bright glossy color externally, while the mucou membrane internally gave indications of profuse infiltration of blood the gut itself contained some claret-colored stinking fæces; the liver an

gall bladder were natural; the urinary bladder empty and contracted. With these exceptions all the other viscera were apparently healthy, but looking blanched.

7. Having completed this work, I proceeded next to examine the herd, which comprised 80 animals; among them I detected two cows that were evidently ill. One a light-red, aged cow, was then in a high state of fever, with a full excited pulse, dry hot skin, roughish coat, weeping of the eyes, and dry nose; mouth hot and of a peculiar yellow color, with two large ulcers at the point of junction between the mucous membrane and skin on either side; the animal itself appeared dull and loathe to move.

8. A white, aged cow, greatly emaciated, weeping profusely from eyes and nose; that from the latter glary; mucous membrane of the mouth was abraded on either side forming oval patches; skin dry, some heaving of the sides; pulse feeble, state of bowels not known. With these exceptions the herd was looking well, though weakly and emaciated.

9. We then proceeded to the "Stanmore" Estate, the property of the Honorable Mr. Norton, where I learnt that a larger mortality had occurred. We were met by Mr. Fairweather, the Superintendent in charge, who at once sent for the herd of cattle belonging to the estate, and among them a bull and a cow were found tainted, as indicated by the following appearances:—

I. A greyish-white, aged bull, had a dull heavy look, and showed disinclination to motion; heaving of the flanks, profuse weeping of the eyes, a ropy mucous hanging about the nostrils and mouth; the latter was hot and its mucous membrane presented a worm-eaten appearance. When the animal was thrown for examination, he could not be roused up again for a while, and seemed to prefer the prostrate position; pulse small, but imparts a wiry feel to the finger along the inner part of the arm. On passing the hand quickly over the naked parts of the skin about the lower part of the abdomen, inner sides of thighs, &c., a rough sensation was felt, but no eruption of any kind could be seen. (The rough feeling of the skin noticed at the *post mortem* examinations was probably caused by a congested condition of the cutaneous vessels.) A reddish blush or tinge was also observable in some parts of this animal.

II. A greyish-white, aged cow, extremely attenuated and enfeebled; no weeping from the eyes, nose or mouth, no ulceration in the latter, but there is heat and dryness; coat staring and rough to the feel; pulse scarcely perceptible, action of the heart feeble; there are no indications of the presence of diarrhœa. The seventy other head of cattle comprising the herd, though in lean condition, were healthy.

10. *7th April.*—Visited Nagalore again this morning, found the vaccinated calves doing well; the two sick animals were better, in fact approching convalescence; no fresh cases could be detected among this herd. On the "Stanmore" Estate, the cow noticed as being ill at my last visit is now dead; the bull better, but there is still some weeping of

the eyes, hot mouth, and a couple of well-defined ulcers in the mucous membrane of the lower jaw under the tongue; pulse of tolerable strength. Two fresh cases noticed to-day, both aged cows, with well-marked fever, dull, watery, moderately strong.

11. *19th April.*—No fresh cases have ocurred either on Captain Short's or the "Stanmore" Estate; the sick cattle are doing well, and I have reason to believe that the disease has now been got rid of; the vaccinated calves continue in health. I have asked Captain Short to watch their eyes further.

12. From such opportunities as I had of seeing this disease, and the appearances brought to light by the *post mortem* examinations, I am inclined to the belief that it is essentially an eruptive fever, allied to small-pox, and closely resembling the great cattle plague, known under the name of *Rinderpest*, which the English periodicals have made familiar to every one. The Malayalees occupying villages in the vicinity of the estates where I had an opportunity of observing the disease, sustained, I am told, the greatest loss of cattle from it. Among Captain Short's herd of 80, there were 22 deaths, giving 27½ per cent. of fatality. On Mr. Norton's estate, the herd comprised 103, and there were 33 deaths, or a percentage of 32·03. Native herdsmen, though seemingly aware of the infectious nature of the disease, never dream of isolating the tainted from the sound cattle; on the contrary, they still continue their well-known reckless practice of huddling them promiscuously together in small ill-ventilated pens or byers, reeking with filth and foul effluvia; is it a wonder, then, that the disease should disseminate itself with cholera-like rapidity from herd to herd, destroying the cattle in vast numbers?

13. Endeavouring to trace out the cause of this disease, I found that it primarily broke out at the village of Nagalore, from whence it spread to two other hamlets in the vicinity, and lastly attacked Captain Short's and Mr. Norton's cattle. The fact that the pasturage ground where the disease originated was common to all these localities, easily accounted for its spreading among these different herds; but how it first began at Nagalore I was unable to trace satisfactorily. This would, no doubt, prove an interesting question to determine, but the time and means at my disposal were inadequate for this purpose.

Treatment.—I did not pursue any particular plan of treatment, but merely made general suggestions, such as exclusive segregation of the infected cattle, attention to cleanliness and to the food of the animals; the sick cattle I recommended being put on a more liberal allowance of fodder, and congee made of cholum or raggee. I am of opinion that much benefit would be derived from the administration of stimulants. The weather, which had hitherto been hot with no rain, improved somewhat about this time. On the night of the 2nd of April, we had a small shower, followed by another on the 3rd, accompanied by a slight thunder-storm, which tended to cool the atmospheric temperature very much. This favorable change in the weather, I am of opinion, materially assisted in putting out the disease.

14. Simultaneously with this outbreak at Nagalore, one of a different type occurred at Yercaud, among a herd of cattle owned by Messrs. Lecot & Co. Through the kindness of J. Lemesle, Esq., I was afforded an opportunity of inspecting the carcase of an animal that had died from this disease, as well as several cattle whilst suffering from it. The *post mortem* examination which I conducted on the 11th April, in the presence of Mr. Lemesle, revealed the following morbid appearances:—

The carcase was that of an aged cow, greatly emaciated, but, in all other respects, looking natural externally. On laying open the viceral cavities, the appearances, indicating disease, were found chiefly in the chest. The base of each lung was occupied by a large *acephalocystis* about the size of a man's double fist, imbedded deeply in the substance of each organ; besides these, attached along the free margin of each lung were five or six cystic tumors, varying in size from a marble to a large hen's egg, these cysts were found filled with a transparent fluid, with the exception of the larger one in the right lobe, the fluid in which was tinged yellow; the fluid itself was contained in a distinct pellucid membrane, fitting close and lying free in the cavern which each cyst had hollowed out for itself, in the substance of the lung, thus destroying at least two-thirds of the tissue composing the organ. In the abdominal cavity no morbid indications were detected, with the exception of two small superficial hydatid cysts, which were found on the convex surface of the liver; these cysts were from three to four inches apart.

15. Notwithstanding the extensive mischief it is seen the presence of these hydatids cause to the pulmonary organs, the only indications denoting their existence during life-time are great debility, coldness of the extremities, tremor, loss of appetite, and constipation. Cough or dyspnæa are never observed. The two animals that I myself inspected suffering from this disease presented much the same appearances, *viz.*, extreme emaciation and general debility, cold extremities and fluttering pulse. I learned that ten animals out of a herd of 130 head of cattle died from this disease on these hills. This entozoóns disease prevailed on all the estates at Yercaud, with one exception, which I shall notice hereafter. As to the cause of this disease, I could come to but one conclusion, *viz.*, a deficient supply of nourishment; for the very appearance of the cattle indicated impairment of vital power from starvation, and the best remedy I found was a liberal allowance of fodder and grain food. The mortality from this disease, I am told, was greater on some of the other estates than on that of Messrs. Lecot & Co. Planters and other cattle proprietors on these hills suffer under difficulties as to cattle fodder during the hot months, *viz.*, February, March and April; they make no provision for this time of the year, nor do any maintain pasturage grounds for their cattle, every piece of spare or suitable land being sooner taken up for coffee planting, and what makes matters worse great attention being paid to cleanliness, rank vegetation and weeds of every kind that might afford nourishment to cattle are destroyed, and thus the poor animals are literally starved. Let loose at daylight after passing the night in their own filth, they stray over great distances, vainly endeavouring to pick up a sufficient quantity of pasture, but as during this season there prevails a universal drought so that scarcely a blade of grass is to be seen nor any

stubble except in inaccessible localities, it is very little indeed that th unfortunate herds can pick up in the course of the day: in the eve they are driven back to their byres in almost the same starving condi as they left it in the morning. A few planters are in the habit of se ing out coolies to fetch forage, consisting of hill or thatch grass, wh is spread out before these famished brutes ere they are shut up for night, and is greedily devoured by them; but what are a few bun among a herd of starving animals? Many of the planters, however, nothing more than allow their cattle to graze and pick up what they can, which in this season amounts to positively starving them, and such is really the case is demonstrated by the miserably poor skin-a bone condition of their cattle.

16. Finding such a lamentable state of things, and being f convinced that the entozoóns disease that I have described owed origin entirely to this cause, I was led to consider whether these could not be remedied by substituting in the place of grass some o substance as fodder for the cattle during those months, when all pasturages become parched and dried up, and having observed on occasion some pack-bullocks greedily devouring the dried husks of coffee cherry, the idea of using this substance for this purpose occu to my mind. These husks, in my opinion, would make excellent fo for cattle; the pulp contained in them, it is well known, is rich i charine and gummy matters, which must render them highly nut and on the score of abundance of supply and cheapness there is no m on these hills that could be compared to them. Every maund of of coffee bean, it is calculated, will yield exactly double that quantit husks, so that a very large supply must at all times be available if providently stored up and issued out to the cattle at the rate of or six pounds daily, I conceive that the result would be of be to the planter as well as to his cattle. Not only would he thus excellent folder, sufficient to maintain his herd in health and condi during the trying period of the year, but he would also not lose husks for manuring purposes, for by their transition through the li laboratory of the cow, they become transformed into a superior kin manure in the dung of the animal, much more so than they can become by the simple process they undergo in the manure pit, secu thereby a double advantage. As it is these husks are valueless to planter except as manure. It is possible that some cattle may re to eat them at first, which need cause no surprise, for it is known cattle refuse horse-gram and other grain when not accusomed to use, but a little coaxing very soon overcomes this dislike. It woul necessary, perhaps, to steep the husks in water to soften them, paratory to issuing to the cattle. Unfortunately the coffee husks already been transferred to the manure pit this year, so that a trial not be made until next. One or two gentlemen, to whom I made suggestions, have promised to act up to them; considering that during the dry season only that the coffee cherry is harvested, d and husked, it is rather surprising that this idea of using the hus fodder was never thought of by any of the planters.

17. During the prevalence of the entozoóns disease at Yercaud stated that there was one exception; this I will mention now more p

cularly. Not far from Messrs. Lecot & Co.'s plantations there existed a herd of cattle belonging to a gentleman, who owned a neighbouring estate; this herd, comprising some 70 or 80 head of cattle (chiefly cows and buffaloes), did not suffer in the least from the epidemic at any time that it was prevailing; on the contrary, the whole herd enjoyed remarkably good health, and kept in tolerable condition; while the cattle around were sickening, one after one and dying fast. On closely investigating this singular immunity, I found that these animals were in the habit of daily feeding on large quantities of orange leaves; not only did they greedily devour every dry or withered leaf shed from the trees, but they also had access to the lower branches of the trees themselves, which they pilfered freely of their foliage. The trees, of which there were a large number, comprised the sweet and bitter variety of oranges, lime, and pomeloes. I myself had often been amused watching this herd, as soon as let loose in the morning straying into the plantation, where they would be seen daily collected in numbers round the orange trees, some eagerly cropping the leaves within reach from the trees, and others picking up those that had fallen. This habit seemed to have attracted the attention of the owner also, who, finding that his trees did not suffer any injury from this clipping process they were thus daily subjected to, while the cattle themselves seemed to improve by it, did not molest the animals in their depradatory practice. Now, it is well known that the leaves of the orange tribe abound in a volatile fragrant oil, and I am of opinion that to this food alone they owed their immunity from the entozoóns pest from which the cattle on the other estates suffered so largely.

Cow-sheds or byres.—There may be some excuse in the case of poor ignorant natives not attending to cattle hygienes, but gentlemen who expect, and often do realize, not only a competence but a fortune from planting operations, and who are obliged to keep cattle on their estates on account of the manure they yield, should not allow the poor unfortunate brutes to die of starvation, for which there can be no excuse, and in this matter, instead of being a guide to the natives, they prefer to be guided by them. The cow-houses at present in use on these hills consist of a large thatched shed, and a walled enclosure termed a *puttee.* The shed frequently has a small wattled partition at one end to enclose the calves; the floor is unmade, and on it dung and urine accumulate from one year's end to the other, or when it perhaps suits the convenience of the planter to remove to the plantation. In no instance is the cow-shed cleaned oftener than once in a fortnight, and this is done by only some one or two planters, so that the cow-house is literally the dung pit also; frequently, to absorb the moisture caused by the urine, not only the coffee cherry husks but ferns and leaves of all kinds are thrown in, which, mixing up with the urine and dung, is constantly undergoing putrefaction, and emanating the most foul effluvia, and it is on this mass of putridity that these starved cattle stand and lie down. The legs of the animals are submerged up to their fetlocks in dry weather, and in the rainy season up to their knees, in the pool of filth that constantly cover the floor. The wonder is, how, under these circumstances, the cattle do not perish in greater numbers than they do. Very little consideration on the part of the planter would tend to

mitigate these evils, and conduce to the health and comfort of cattle. All that would be necessary is, that the floor of the cow-sh should be well faced with stone and chunam, to render it water-ti and that both of the shed and puttee should slope towards the centre as to form a shallow drain, which would conduct away all the urine soon as passed to a pucka-built cistern, which may be placed out immediately adjoining the enclosure, which should also be covered with thatch, grass, or other material; the contents of the cow-sh should be daily swept up and cast into the manure pit; fresh leaves ferns may be added, if thought necessary, for the animals to lie Such measures would not only secure cleanliness and dryness of flooring, but also would preserve the air in a sweet condition; covering the manure pit, sun and rain will be kept out, and in the not only excellent manure obtained but the cattle likewise be maint in health and comfort throughout the year.

OOTACAMUND, 15*th May* 1866.

J. SHORTT, M. D., *Asst. Surgeon, Genl. Supdt. of Vaccin*

Forwarded to the Chief Secretary for the information of Gover To be returned when no longer required.

J. SHAW, *Offg. Prin. Inpr. Genl., Medical*

Transferred to the Revenue Department.

22*nd May* 1866.

J. GROSE, *Under Secy. to*

Orders passed by the Madras Government, No. 1347, dated 1st June 1866

1. The Officiating Principal Inspector General will convey acknowledgments of Government to Dr. Shortt for his very valu report, which will be communicated to Mr. Thacker, and laid on Editor's table.

2. The Governor in Council trusts that Dr. Shortt's exa will be followed by other Medical Officers, as opportunities offer.

Report from MR. J. THACKER *on the Cattle Disease of this Presidency.*

1. In compliance with the order of Government, dated April 1866, No. 957, I have now the honor to submit my first r for the quarter ending 31st July; the reason for the delay in forw ing which was my desire to be enabled to say the disease had ce around as well as in Bangalore, which is now the case.

2. Immediately on receipt of the Government order above quoted, I commenced an investigation into the nature of a disease called "Tondinow," visiting the villages on the Neilgherry Hills, where it was stated to be prevalent, but was only enabled to see two or three cases of animals actually attacked, which I treated; the impression forcing itself upon me that the people were averse to any interference, as I ascertained that, during May, thirty-three fatal cases in two villages only occurred. The statistics I was enabled to gather were not many, and the information was unwillingly given; but though I can hardly call them reliable, I here shortly state the deductions drawn from them, which I shall hereafter endeavour to verify and amplify.

3. I had not heard much of this disease before, but from what I could learn, together with the result of dissections, it appears to me to be an attack of malignant sore throat, generally terminating fatally in from twenty-four hours to four or five days.

4. The malignity of the attack seemed to culminate in the hottest weather, and after the early rains to subside. I attribute its severity this year to be due to the unusual drought, and the consequent inability to obtain sufficient pasture except in the swamps, where they are more subject to miasmatic influence than on the uplands.

5. At the end of May and beginning of June, I received a report of an outbreak of rinderpest in Bellary and Kurnool; the attack, at the former place, was of an ordinary type, but at the latter it seemed to have set in with such severity, that out of fifty-five animals attacked, forty-five succumbed. I started at once for Kurnool. On arrival, however, at Bangalore, severe sickness among the Government Commissariat cattle detained me for a time, and as I received a telegram on the 20th June to the effect that all sickness there had ceased, I gave my whole time to watch the disease.

6. The type of rinderpest here was virulent, at one period so much so that I feared losing every animal then under my treatment:—

Number of cases.	Died.	Cured.	Per cent of cures.	Remarks.
39	26	13	33·33	Treated before my arrival.
29	15	14	48·27	Do. subsequently.

The treatment pursued by me was substantially the same as before used, and already reported. I had everything I required to assist, but the recoveries are less than at Kurnool in 1864, where I had not so many advantages.

7. At one time the type became so virulent that within twelve hours half my patients died, and I feared much for the remainder. Steps were immediately taken to remove the herd of healthy cattle quarter of a mile away, to be picketed in detachments at intervals of two hundred yards; the immediate effect of which was to modify the type, and eventually exterminate the disease.

8. A case of sickness occurred on the Hills in the early p of the year, and vaccine matter was telegraphed for, to Madras, to c out the series of experiments as desired by Government; on hea which Dr. Shortt sent up some animals that had been operated on test their immunity from rinderpest when placed in contact w diseased cattle; such was rendered abortive for a time by the sick subsiding.

9. Reports were received from South Arcot that rinderpest p vailed; the sickness, however, soon ceased, having been of a lo nature.

10. The collector of North Arcot also reported that ordin disease existed, attributing it chiefly to want of pasture. It did seem necessary that I should visit either place, but sent a copy of th printed instructions for their guidance.

11. From the report of the disease called "Nulli," occurring the Chendragherry Talook of North Arcot, I regret I was unable arrive at any satisfactory decision of its nature. From the descripti of the symptoms it does not appear to accord with any disease gener known. In the event of another outbreak, I think an investigati would be of much interest to Government.

BANGALORE, 18*th September* 1866.

J. THACKER,
Veterinary Surgeo

Orders passed by the Madras Government, No. 2801, dated 15th October 186

Dr. Thacker should take the first opportunity that offers of inve gating the nature, &c., of the "Nulli" disease.

READ THE FOLLOWING PROCEEDINGS OF THE BOARD OF REVENUE, NO. 2687, DA 2ND MAY 1867.

Read the following letter from the Collector of North Arcot, to the Secretary to Board of Revenue,—(No. 86, dated 6th April 1867.)

I have the honor, with reference to the Proceedings of Board of Revenue, dated 12th December last, No. 880, to report, the information of the Board, that cattle disease of a virulent having broken out in Arconum neighbourhood, Mr. Thacker asked to visit the affected tract. This Mr. Thacker was able to acc plish, and the results of his observtions are recorded in his letter to Acting Head Assistant Mr. Wilkinson, dated 26th ultimo, of whic copy is herewith forwarded for the information of the Board.

2. It is very gratifying to find that the people are to some deg alive to the importance of separating the diseased from the healthy cat

3. I propose embodying Mr. Thacker's observations in a Circular to accompany the vernacular translation of the recipes received with the Board's Proceedings of the 27th ultimo, No. 1933, now under preparation for the Gazette.

From Veterinary Surgeon J. THACKER, *to the Acting Head Assistant Collector of North Arcot, dated 26th March* 1867.

Having completed my investigation of the cattle sickness existing to a greater or less degree in the villages of Chittoor, Attupaukam, Punivaram, Manavantangal, Kilandaray, Nagavadoo, and Pallavarum, I have the honor to report that the disease vekkai is a type of rinderpest.

2. It is both infectious and contagious, and I have found, with much satisfaction, that all necessary steps towards preventing the spread of the disease have been carried out by the village people. The healthy cattle of a village, where the disease appears to have been, were all removed some distance outside, and picketed in numerous small detachments around. The men in attendance upon them, to a certain extent, do not attend upon sick animals. By such means, so willingly carried out by the villagers, I hope soon to hear of the cessation of the disease, and I would respectfully beg to suggest, that under such willing labors of the people amongst themselves to extinguish the disease, that the more rigorous measure of the Cattle Plague Act may be held in abeyance. I would further beg to bring to your notice the ready compliance of the villagers of Pallavarum to destroy all skins, &c., and to bury the cattle which die of this sickness.

3. I have seen seventeen animals laboring under various stages of the disease in Pallavarum, for which I have desired medicine to be sent you without delay. You may remark that I have apportioned only small doses, as I find the cattle of this village much stunted in growth and in very poor condition, and think that a half-powder morning and evening quite sufficient dose for such animals.

4. I find statistically that the cattle of the six prior named villages have died to a larger extent, as of 300 attacked, 250 died and 50 only recovered, whereas in the village of Pallavarum of 128 attacked, 65 recovered. Such striking contrast I find to have arisen from the care and attention of the latter village people, having saved them by daily administerings of quantities of gruel, a matter of great consequence, and one which I would beg to suggest your encouraging to your utmost in any such other villages where this practice does not obtain. I think with liberal potations of gruel and distribution of the murrain powders prescribed in my pamphlet, many recoveries may be effected, but in conclusion I would wish prominently to advise the system of segregation carried out at Pallavarum being more extensively known and recommended to any other village which become infected.

The Collector's proposals in paragraph 3 are approved.

2. His letter, with its enclosure, will be submitted for the information of Government.

Orders passed by the Madras Government, No. 1098, dated 15th May 1867.

Ordered to be recorded.

READ THE FOLLOWING PROCEEDINGS OF THE BOARD OF REVENUE, No. 3423 DATED 4TH JUNE 1867.

Read the following letter from the Collector of North Arcot, to the Secretary to the Board of Revenue,—(No. 105, dated 1st May 1867.)

In continuation of my letter, dated the 6th instant, No. 86, I have the honor to forward, for the information of the Board, copies of two letters addressed to my Acting Head Assistant, by Veterinary Surgeon Mr. Thacker, dated 10th and 15th April 1867 respectively, in connection with the outbreak of cattle disease at Parthiputhur and other villages in the Wallajah talook.

2. Mr. Thacker's recipes and suggestions, regarding the treatment of cattle disease, will appear in the next issue of the District Gazette.

From Veterinary Surgeon J. THACKER, *to the Head Assistant Collector of North Arcot,—(dated 10th April 1867.)*

I have the honor to report that I have again visited the villages of Killandury, Pallanvaram, and Pulloor, situated in your district, with a view to investigating cattle sickness, and rendering assistance in endeavouring to prevent its extension and assist its cure.

2. At Killandury, I find there are now only three remaining cases of vekkai, and those of a milder type. I left medicine for their use, and trust the cases will recover.

3. I am happy to report that the measures of segregation, suggested on my last visit to Pallavaram, and so readily carried out by the villagers, has resulted in the extinction of the disease, only one case now living, that not so much labouring under the disease itself as from debility resulting from a severe attack. Two cases only occurred since the segregation of the herd was carried out. Of the seventeen cases, existing on my former visit, seven are reported to have died.

4. Hearing of an outbreak in Pulloor, I proceeded to the village, and found the same disease vekkai to exist; examined thirteen cases; one improved, twelve died. The disease broke out about ten days ago. I have urged upon the Monigar the importance of at once removing all the healthy cattle, picketting them at a distance around the village in small detachments with every care that the sick be kept in the village for treatment. Medicine has been supplied them by me. The Monigar states there are about 2,000 head of cattle in the village, and appears willing to adopt the measures recommended by me for the prevention of its spread; but if I might be permitted to suggest the idea, should feel obliged if you would be so good as to support my suggestion by your official recommendation that it is carried out. I should likewise feel obliged if you can furnish me with reports from this village, with a view to obtaining information of the effect of the steps taken and remedies used, as I am unable to remain longer now in the district, and thus enable me to supply a necessary amount of medicine.

From Veterinary Surgeon J. THACKER, *to the Acting Head Assistant Collector, North Arcot,—(dated 15th April 1867.)*

In consequence of a report of sickness having broken out amongst the cattle in the village of Perrethpatoor, I have visited them this morning, and find the sickness to be the vekkai. I gave full instructions regarding the segregation of the animals, and gave medicine for the sick.

2. I am now about to proceed to Kongiem, in the Coimbatore District, but hope to return to Bangalore in the course of a week or so; should you think I can then be of any further assistance in endeavouring to stay the spread of this disease here, I shall be glad to hear from you, and also to send you a further supply of medicine if needs be for such.

3. I would wish to seek your official assistance in persuading the people to adopt the measures of segregation so strongly advised by me, feeling assured that if faithfully carried out, the disease may be stopped.

Submitted to Government, in continuation of the Board's Proceedings, dated 2nd May 1867, No. 2687.

2. The Board trust that the Head Assistant Collector is giving Mr. Thacker all the assistance in his power.

Orders passed by the Madras Government, No. 1380, dated 21st June 1867.

Ordered to be recorded.

READ THE FOLLOWING PROCEEDINGS OF THE BOARD OF REVENUE, No. 1933, DATED 27TH MARCH 1860.

Read the following report from J. THACKER, *Esq., Veterinary Surgeon, Bangalore, to the Secretary to the Board of Revenue, dated 22nd February 1867.*

In submitting my present report to Government, I have the honor to state that, during the past season, cattle have been comparatively healthy.

2. On the 17th December 1866 the Collector of Kurnool reported the outbreak of a new form of cattle disease, known amongst the natives by the name of "Domma Pegooloo," the first intelligence of which reached me through the Proceedings of the Revenue Board, dated 4th October 1866. In a letter received by me from the Acting Collector I gather that only thirty cattle were seized by the disease, of which fifteen died, and the remainder recovered. No detailed information further than that sent to the Board of Revenue was procurable, or sent to me.

3. A description of, and suggestions for, the prevention of the extension of the disease is attached in Appendix A. So rapid is the progress of this malady, and so great my want of confidence in any known treatment of it, that I look chiefly to the adoption of preventive measures for reducing the losses occasioned by the disease.

4. In October I was informed, through the Commissary General, of an outbreak of sickness amongst the Government cattle at Bellary. From a clear description of the disease by the officer in charge, I was enabled to recognize a type of rinderpest implicating the brain. A telegram was despatched, directing a mode of treatment for the sick, and recommending segregation and other measures for the healthy. The outbreak soon ceased; the number of animals attacked being ten only, of which eight died, and two recovered. The important step so promptly adopted of dispersing the herd resulted in stopping further ravages of the disease.

5. Official information from the Special Assistant Collector of Ootacamund, during December, of an outbreak of the foot-and-mouth disease in Kandal, of an unusually serious type, the deaths being over fourteen per cent., led to my considering a visit to that place necessary. On arrival and inquiry there, I found that the fatality had been aggravated by the owners of the cattle employing sick animals for work, because of the scarcity in the number of these required for draught purposes.

6. At eleven other villages which I visited, I found as many as 280 sick animals in various stages of the same type of disease as had manifested itself at Kandal. I heard of no casualties amongst these. At and about Segore, I saw more than seventy cases of the same disease; none of the cattle died.

7. Considering there was nothing unusual in the mortality that I saw, I deemed my further stay in the district unnecessary, and left it after the disease had been extinguished at Kandal. A description with a simple mode of treatment of this particular disease, is shown in Appendix B.

8. As an instance of the ignorance and superstition prevailing in the minds of natives in connection with this disease, I beg to enclose (Appendix C,) for perusal a memorandum written by one of themselves, which will show the difficulty I have in inducing them to follow any rational mode of treatment. The memorandum, though containing some good practical hints on the subject of the treatment of the disease

recommends the observance of such childish ceremonies, that to induce them to adopt any proper plan of treatment for the more serious and fatal cattle diseases, is almost impossible.

9. The collectors of South Arcot, Kurnool and Kistna Districts, have communicated with me on the subject of an outbreak of some slight but interesting cattle diseases; the information these gentlemen sought I have been enabled to furnish. The extent and character of the diseases have not necessitated my visiting the districts, nor do they call for any special remarks in this report.

APPENDIX A.

The outbreak of disease in the Koilguntla talook of Kurnool, known by the name of "Domma Pegooloo" in Teloogoo, in Badaghar 'Tondinou," in English "malignant sore-throat," is accompanied by fever resulting in death ensuing from suffocation.

Causes.

Endeavouring to trace these, I thought many of the cases arose among animals feeding in swamps, thereby subjected to miasmatic influence; but as the same conditions did not exist in more recent cases occurring in the plains, there are, I think, other exciting agencies, in some manner connected with seasons of drought and sudden changes at the commencement of monsoon. It is infectious, and as no measures are used to separate the sick from the healthy animals, the disease is thus spread far and wide, and its type eventually much heightened in malignancy.

Symptoms.

1st Stage.—The attack is sudden, appetite failing, cessation of rumination, drooping ears, pulse quickened.

2nd Stage.—Swelling around throat, difficult breathing, protrusion of head, discharge of saliva from mouth, countenance anxious, visible mucous membranes congested, pulse quick and small.

3rd Stage.—Symptoms heightened, pulse almost imperceptible, swelling of throat greatly increased, extending down the neck; respiration painful, laboured, short, quick, great prostration.

Treatment.

I. *Prevention.*—Separation of the sick should be the consideration, and, wherever the outbreak is extensive, a change of locality, or pasturage, or kind of food would mitigate its type, and assist in its eradication. Cleansing of buildings in which have been sick animals would also tend towards this end.

II. *Cure.*—From the rapid swelling of the throat, and inability to swallow, any medicine administered must be at the commencement of the attack, or it would be difficult, and attended with a liability to its passing into the lungs, producing suffocation. No class of medicines or external applications appear to have any such specific effect as to induce

me to rely on, or recommend them. "Tracheotomy," which is making an artificial opening in the windpipe for breathing through, suggests itself as the only mode by which suffocation might be prevented, but such could only be performed by a taught operator, and consequently I cannot recommend it for use amongst ryots. To decrease the loss of cattle from this disease, those means under the head of prevention, if faithfully carried out, would, I think succeed to a large extent.

Post mortem.—The swelling around the throat, extending down the neck, and in the some cases into the substance of the lungs, consists of a yellow gelatinous-looking deposit from the blood. The mucous lining membrane of the throat highly inflamed, its surface being in some blackened, places and approaching a state of decomposition.

APPENDIX B.

Epizootic Aptha,

commonly known as "Foot-and-Mouth disease" is a specific fever, contagious, generally epizootic, and attended with the formation of vesicles or blisters on the tongue, inside the lips, roof of the mouth, and clefts of the hoofs.

Symptoms.

1st Stage.—Loss of appetite, dry nose, slight redness of the lining of the eyelids and nostrils; pulse somewhat quickened; skin hot, and cessation of rumination.

2nd Stage.—Febrile symptoms heightened; when standing, frequently holding up and violently shaking the feet, sometimes obstinately laying down; discharge of saliva from mouth, frequent smacking of the lips, or champing the jaws. An examination will discover numerous vesicles in the mouth, and between the digits of the feet, on the complete formation of which the fever gradually subsides, and as the tongue becomes less sensitive the appetite returns.

Duration.

From seven to fourteen days elapse before the patient may be considered convalescent, but a return to draught labour may be indefinitely prolonged for the healing of the vesicular sores of the feet.

Treatment.

I. *Prevention.*—Generally occurring in an epizootic form and being an infectious disease, perfect separation from healthy animals should be the first and chief aim.

II. *Cure.*—As a rule the disease may be permitted to run through its stages without having recourse to medicines, but from the soreness and pain of the vesicles in the mouth, little or no food of the usual

hard dry kind is eaten; it is, therefore, necessary to support the strength by offering soft food, such as bran mash, or young green grass, and in case this cannot be eaten, pour five or six quarts of gruel down the throat daily with a drenching horn. The blisters of the mouth and feet should be opened, and the latter kept carefully cleaned and free from maggots, to prevent which the best application is oil or spirit of turpentine mixed with an equal quantity of cocoanut oil, but where a difficulty of procuring this occurs, the following mixture may be used:—

Camphor	...	...	... 3 oz.
Cocoanut oil	...	...	... 1 pint.

After the fever has entirely subsided, some benefit may be expected from causing the animal to stand five or six hours daily in clean cold water. I consider the common practice of covering the wounds with quick-lime very prejudicial, producing sloughing, thereby retarding the cure. A large comfortable bed of dry straw should be given to induce the animal to lie down as much as possible.

APPENDIX C.

Memorandum of the origin, symptoms, and cure of the cattle disease called "Cala jarah" and "Bayi jarah" prevailing in Mysore, as ascertained from some of the old and respectable ryots of Toomkoor.

Origin, symptoms, and progress of the disease.—No sooner are bullocks attacked with the disease called "kala jarah" "bayi jarah" when saliva begins to pour out from their mouths, and they refuse grass. Matter and blood also flow from their nostrils. Their hoofs get sore and are unable to stand steady. Cattle attacked with this disease begin to shake with ague. Water flows superfluously from their mouths for three days incessantly, and they reject all food.

Remedy for this disease.—"As soon as the owner who keeps a small number of cattle, *i. e.*, within ten heads, apprehends the symptoms of the disease among his cattle, he should boil the plant called 'putchari chekkay' with water, he should then cause their mouths and legs to be well washed with the same, both morning and evening, which course will prevent flies settling on their mouths and nostrils. Raggi umbli (gruel) in which plantains should be mixed up ought to be given them for food. A wet cloth plastered with red earth, should be applied to their backs; and to keep the cloth wet, water should be constantly sprinkled. This gruel (or raggi umbli) mixed with a sufficient quantity may be given to the cattle for drink, instead of water, and after a lapse of three days, their legs will be strengthened a little, and they will be inclined to eat grass. When this inclination is perceived, paddy straw should be given to them immediatly, and after they partake of this straw, which would remove the infection of fever on their tongues, any kind of grass may be given to them."

Remedy to cattle kept in large numbers in jungles.—"Two jagalies or platforms should be erected in the jungle opposite to each other, one to the east, and another to the west, each of the size of one square-foot,

and at about 3 P. M., five pieces of "Bewachellor" quartz, should be placed to the east of the western platform, and three to the west of the eastern platform. After which certain joojas to be performed to the native baugle called "balay," and the palmira leaf called bitchalay. A kid should be killed in the eastern direction, and its intestines tied to the trees in the north and south. The cattle belonging to the herd should be made to pass from the western over the flesh, and the stones to the of the east, when the blood running out of the belly of the kid that killed should be sprinkled over them.

"When the above animals enter their pound in the evening, another kid should be killed near the entrance gate of the pound, and its blood, flesh, &c., should be sprinkled all round; as the goats live on variety of plants, kids are generally sacrificed for this purpose.

"Either 'Balachennemjee' or 'Haraka' mixed with tyre should be scattered over the cattle at 5 A. M. This must be continued for three days when they would get a little strength and prosper.

"If they be only attacked with "kala jarah" they eat straw, but if with "bayi jarah" they do not eat it; some animals are apt to be attacked with one of the above, or sometimes with both of the diseases.

J. THACKER,
Veterinary Surgeon.

Submitted for the information of Government. Owing to the comparative absence of epidemic disease among cattle, Mr. Thacker's services have happily been little required during the past season. At the same time, the Board consider it advisable that he should continue to prosecute his present investigations.

2. The Board request collectors to have the Appendices A. and B. of the report carefully translated into the vernaculars, and published in the several District Gazettes, for general information.

Orders passed by the Madras Government, No. 1578, dated 16th July 1867.

The Government desire to receive Mr. Thacker's opinion as to the necessity for his further retention on the special duty of investigating cattle disease to the exclusion of his Military duties.

READ THE FOLLOWING PROCEEDINGS OF THE BOARD OF REVENUE, No. 6970, DATED 25TH OCTOBER 1867.

Read the following papers :—

REPORT.

Cattle disease at Coonoor and Trichinopoly.

Since I furnished my last report, I received a communication from the Collector of Coimbatore, forwarding a letter reporting the existence of disease among cattle at Coonoor; also a letter from the Collector of Trichinopoly to the same effect. Intelligence, however, reached me at this time, from the Sub-Collector of Madras, of two diseases called by

MADRAS.
"Vekkai" and "Anal Vekkai."

the natives "Nir Vekkai" and "Anal Vekkai," in the latter of which the animal attacked was stated to break out with a pustular eruption over the body. Believing this form of disease similar to, if not identical with, that referred to in paragraph 13 of my report, dated 17th May 1864 (Proceedings of Government, Revenue Department, 13th July 1864,) as "most prominently dwelt on in all the printed reports," and being one which I had hitherto had no opportunity of witnessing, claimed my first attention. There appeared to me to be an opening for a series of experiments in inoculation such as had never hitherto been carried out in this country, and for which no opportunity presented itself at home during the late cattle plague. Bearing in mind the orders of Government on this subject, expressed in Proceedings above quoted, and not considering former experiments in inoculation, conducted by me, and detailed in my report of 2nd March 1866, either sufficient or complete, I was the more anxious to take advantage of this occasion. It was my intention, therefore, at once to proceed to Madras, thence to visit Trichinopoly, and finally Coonoor. In consequence, however, of the receipt, at this time, of a notification that my services would be required at Oossoor on the 4th March, (in conformity with order of Government, No. 112 of 14th January 1867), I was only able to visit the Madras District.

CONJEEVERAM.

2. Although no time was lost, inasmuch as I started for Conjeeveram immediately on the receipt of the report from the Sub-Collector of Madras, on arriving at that station, and on the Sub-Collector's making further inquiries, we were sorry to find that the disease, reported from Pennakur and adjacent hamlets, had apparently ceased to exist, not before, however, it had carried off about 300 head of cattle.

TRICHINOPOLY.
Fever of typhoid character.

3. Having been unable, for the reasons above quoted, personally to examine into the disease reported by the Collector of Trichinopoly, which was a fever of a typhoid character, I gave him all the assistance I could in writing, and stated that, should the sickness continue, I would visit the district at the earliest opportunity.

BELLARY.
Sickness in Anantapur talook.

4. Intimation was received from the Collector of Bellary of the existence of cattle disease in the Anantapur talook; the extent of its prevalence was not, however, mentioned. A written plan of instructions was forwarded, and further information requested. No communications having since been received on this subject, I am led to conclude that the plan was successful.

COIMBATORE.
Murrain in Collegal.

5. At this time I was informed by letter from the Collector of Coimbatore of an outbreak of murrain in Collegal; but he could not, on account of the unhealthy nature of the country, recommend my visiting it at that season of the year. I sent medicines, and despatched written instructions for treatment, and the adoption of measures calculated to check the spread of the disease, with a request that I might be kept informed, as far as practicable, of its progress, and result of the measures adopted.

Oossoor.
Remount Commission.

6. From Conjeeveram, in obedience to orders, I proceeded to Oossoor, and conducted my duties in connection with the Remount Commission there.

North Arcot.
"Vekkai."

7. I now visited the villages of Chittoor, Attapaukum, Pannavaram, Manavantangal, Killandury, Nagavadoo, and Pallaveram in the North Arcot District, for the purpose of eradicating a sickness called "vekkai," a type of rinderpest, which had been reported by the Collector. In furtherance of the object of my visit, and with the view of influencing the ryots to carry out any directions which it might prove necessary to give, the Head Assistant Collector kindly accompanied me through these villages. We learned that the disease had advanced steadily from east to west, commencing at Chittoor, proceeding through Panavaram, Attapaukum, Manavantangal, and Killandury to Nagavadoo. The impression of the people was that this disease came with the long-shore or south-easterly wind prevailing at this season, which would imply that it is of an epizootic nature; they were well aware of its highly infectious or contagious character, and therefore they more readily assented to the plan of segregation which we deemed it necessary to enforce. Out of 330 animals attacked 250 had died, 50 recovered, and for the remainder, in various stages of the disease, the plan of treatment as laid down in my pamphlet was recommended and medicine supplied. On visiting Pallaveram, where the same disease existed, I found a striking decrease in the rate of mortality (of 128 cattle attacked 65 had recovered) arising from the greater care taken by the people of this village in supporting the strength of the animals with frequent draughts of gruel. Here also medicine was left and segregation recommended.

Coonoor.
Disease from impoverished condition of blood.

8. Thence I proceeded to Coonoor, and had an opportunity of making two *post-mortem* examinations of animals which had died of the disease on the Hill Grove Coffee Estate, where of fifty cattle twenty-nine had been lost. From the appearances I was led to conclude that the pre-disposition to the sickness was an impoverished condition of blood which induced derangement of the digestion, but there appeared to be nothing of an infectious or contagious nature, neither did I consider the disease of a character such as would not be remedied by some simple corrective.

Salt remedy.

In the only then remaining cases I recommended small doses of common salt, and suggested that the same should be periodically administered to the herd, the result of which treatment has since been reported as most successful.

Deficiency of salts in soil of hills.

I would here beg to remark that I am satisfied that to a deficiency of saline matter in the soils of these hill ranges, the impoverished and deteriorated condition of cattle and sheep, and the frequent occurrence of diseases of this nature, are in a great measure to be attributed, and would, therefore, strongly recommend this method of prevention of disease to the notice of owners of cattle and sheep on the Neilgherry Hills.

Cuddapah, Coimbatore, and Madras Districts.

9. On my return receiving reports of sickness from the collectors of Cuddapah and Coimbatore, and the sub-collector of Madras, I took this opportunity of again visiting the scene of former outbreaks in the district of North Arcot en-route.

North Arcot.

The directions given on the occasion of my former visit here proved to have been of the greatest benefit. In the villages of Chittoor, Attapaukum, Pannavaram, Manavantangal and Nagavadoo, the disease had entirely ceased, while at Killandury only three cases were extant, and in these the animals were suffering more from debility consequent on the attack than from the disease itself. At Pallaveram again, owing to the prompt action taken on my advice of segregation, only two fresh cases had occurred, and both had recovered under treatment. Of the seventeen animals sick on the occasion of my former visit, nine had recovered, seven had died, and one remaind laboring under merely resulting debility.

Madras.
Pullaloor, "Addapan."

10. In compliance with the request of the sub-collector of Madras, I proceeded to visit Pullaloor, where it was reported that a sickness called "Addapan" prevailed; but on arrival at Pulloor was met by the tehsildar of Conjeeveram, who informed me that this sickness was now extinct.

Pulloor, "Vekkai."

At Pulloor, however, I learned that a disease of a serious character had just broken out, and immediately proceeded to visit that village. This I found to be "vekkai." Twelve animals appeared to have died already. I examined thirteen in different stages of the disease, left medicines for them, and directed the same treatment and preventive measures to be adopted as had been carried out with such good effect in the villages of Chittoor, &c.

Cuddapah.
"Saraku."

11. In the district of Cuddapah, which I next visited, the existence of a disease called by the natives "saraku" had been reported. This disease, it would appear, had been prevalent for about a month, but was only brought to the notice of the deputy collector by a villager, when the former was making the settlement of Mudireddipully, and there being nothing in his report to lead me to suppose that the disease was abating, remarking, moreover, that no medicine was given, and that 100 animals had fallen victims, I considered a visit to that village important. On arrival, however, there were only a few remaining cases in an improving condition, and no fresh attacks had occurred for several days. I perceived this to be an infectious type of inflammatory disease, supposed by the natives to be closely allied to the "peddamoosarogum" reported upon in 1864, but of not so acute a character. On investigation, it was found to have originated from the cattle of this village being permitted to pasture on land where infected cattle of the village of Cattapully, a hamlet of Tepereddipully, had lately been grazing, but of its origin there I could obtain no information. Of 105 cattle attacked, only twenty recovered, where no medicines were used or preventive measures adopted; but since the disease seemed now to be abating, I deemed any further stay unnecessary. Leaving, therefore, medicine for the cattle that still remained

sick with the village authorities, and intrusting to the deputy collector and tehsildar supplies and directions in the event of another outbreak I communicated to the collector the result of my investigation, detailing the medicines and treatment which I found to be beneficial in cases of this nature.

NORTH ARCOT.
"Vekkai."

12. En-route to Kongiem in the Coimbatore District, whence sickness had been reported amongst the cattle and sheep, I arrived at Arconum, where I was met by a revenue inspector, who informed me that the village of Pallaveram was now clear of sickness, but that "vekkai" had just made its appearance in the village of Perithipatoor. On reaching this village I saw eight sick animals, seven of which had been placed by the natives themselves under my system of treatment, receiving medicines from the supply which had been left with the revenue inspector; these were fast progressing towards recovery, but the remaining case, the owner of which had declined to make use of these remedies, was in a condition likely to terminate in death. I gave further supplies of medicine both to the moniagar and revenue inspector, and wrote to the acting head assistant collector of North Arcot, requesting his official assistance in persuading the people carefully to adopt the measures of segregation, the importance of which I had strongly insisted on.

COIMBATORE.
Enzootic fever, "Alari-novoo," attacking cattle and sheep.

13. On arrival at Kongiem I proceeded to Veranampollium, the then affected village, as I learnt that at Cadyoor and surrounding hamlets the disease had ceased. Of 1,000 cattle belonging to these villages, eighty had been attacked, six only had died, and there now remained but five cases. On examination of these, which were in a state approaching towards convalescence, I found the disease to be of an enzootic febrile character, resulting in all probability from climatic causes, the most prominent of which I opine to have been the very dry state of atmosphere, and the consequent absence of succulent forage. I had no reason to suppose it either contagious or infectious, and being confident that no further extension was to be apprehended, I left medicine and directions for the sick cattle, and a supply in the event of any other cases occurring. From a further communication I learned that the sick cattle had all recovered under treatment, and that the disease had ceased to exist. The natives apply the same name, "Alari-novoo," to this disease both in cattle and sheep, but in the case of the latter, where of about 1,500, 130 had been attacked and 50 had died, I consider this larger percentage of deaths to result from the objections of the shepherds to pursue any course of treatment, and the comparative inability of the animal to withstand disease, not from the disease being of a more severe character. With the knowledge that were medicines left they would not be made use of, I could only recommend change of pasture.

CUDDAPAH.
"Goondamusara."

14. Communications were received from the Deputy Collector of Cuddapah, announcing the outbreak of a disease called by the villagers "goondamusara" in the Jamalamudugu Talook. From this it would appear that he was making use of the remedies left by me

for the cure of "saraku" as above reported, but as I considered these inapplicable, I telegraphed to him to discontinue them, and forwarded medicine of another class which I deemed more suitable for this complaint. Owing to the prejudices of the natives of some of the villages the medicine did not receive a fair trial, although the deputy collector appears to have used his utmost endeavours in the matter. Where tried, upwards of sixty-five per cent. of cases recovered, but in consequence of its use being confined to a small number, no reliable conclusions regarding its efficacy can be drawn.

NELLORE.
"Sarakuthegalu."
"Pilli sara-kulu."
"Gallikundu."
"Nerida."
"Romarogum."
"Goodipettu."
"Mukkuchedalu."

15. From the acting collector of Nellore, a description was received of diseases of different types affecting the cattle of his district. Although each disease taken separately might not have called for any special notice, yet, when in the aggregate it appeared that 400 cattle had died out of 2,600 in the town, I should have considered my personal assistance desirable, had not a letter reached me at this time requesting me to attend some camels belonging to the Commissariat at Bangalore, amongst which an epizootic had broken out. These, as Government property, claimed my first attention. For the principal and important diseases at Nellore, the nature of which I was enabled to recognize from the descriptions furnished me, namely, "Sarakuthegalu" and "Pilli-sara-kulu," I forwarded medicines and directions for treatment, while of two other diseases "epizootic aphtha" and "malignant sore-throat," (named by the Collector respectively "Gallikundu," and "Nerida,") my opinion and recommendations had already been placed before Government, and by the request of the Revenue Board had been translated into the vernacular and published in the District Gazette for the information of the people. Four other diseases were mentioned, namely, "musara," "romarogum," "gudi-pettu," and "mukkuchedalu," but of none of these could I, without opportunities of personal investigation, form a sufficiently distinct opinion to warrant my laying down a course of treatment. At first, the medicine sent was tried at Lebur without any apparent benefit, whereas, in Nellore itself, the effects were so beneficial as to establish a confidence in its use. Later, however, I was informed that, when the attack had gone beyond a certain length, the medicine had but little effect, and the collector regretted that a want of general success had prejudiced the ryots against the use of it. He remarked, however, that the disease was disappearing with the advent of rain, and consequent abundant pasture.

BANGALORE.
Epizootic amongst Government Camels.

16. With reference to the reported epizootic amongst the Government camels, on visiting them I found seven animals suffering under various affections. I learnt that since the commencement of May seven camels had been lost, and had an immediate opportunity of making a *post-mortem* examination of one which had died the day previous. In this animal, I observed a considerable amount of chronic disease affecting the

digestive and respiratory organs generally. The liver was much enlarged and softened, containing numerous hydatids, the stomach and bowels of a pale unhealthy color; in the abdominal cavity were also observed false adhesions and considerable effusion of serum. The same character of dropsical disease was found in the organs of the chest, the lungs being also congested and partially adhering to the sides and infested with hydatids in the same way as the liver. Of twenty-three animals which came under treatment seven died, and appearances similar to these were observed throughout the *post-mortem* examinations conducted by me. From these evidences, and on further treatment of the sick animals, it was apparent to me, that the disease under which they were laboring possessed nothing of an infectious character. Although the symptoms differed considerably in different animals, the form of disease was the same throughout, and that one to which a robust animal would not have been subject in the same degree, but constant exposure to changes of atmosphere and weather from want of cover had so weakened the constitutions of these animals, indigenous to a dry hot climate, that they were rendered more liable, and succumbed the more readily to such affections. Where in a strong animal such disease would have been withstood, in these they resulted in entozoic formations in almost every organ, re-acting as remote causes to other attacks. Seeing that in cases of this nature there is but little scope for curative treatment, it becomes the more important that the constitution of this naturally delicate animal should be guarded as far as possible, and with this view I would beg strongly to advocate the course of cover being provided for them, and measures being taken to protect them, as far as possible, from sudden vicissitudes of weather.

Coimbatore.
"Kudinow."

17. My immediate attention and personal presence on the hills was deemed desirable by the collector of Coimbatore in consequence of an outbreak of sickness at Kaity, called by the villagers "kydinow," closely allied to "pytchinow," by which name they designate rinderpest. On my arrival, I was met by the special assistant collector, and by his kind co-operation was enabled at once to proceed to investigations. On conducting a *post-mortem* examination of an animal which had died of the malady the previous day, I noticed, it is true, the absence of certain appearances which shew themselves in true rinderpest; but since, in almost every particular, the symptoms noted in the progress of this disease, correspond with those apparent in rinderpest, I attribute the absence of these appearances, more to the influence of season and climate, than to any difference in the type of the malady. It is essentially a disease of a low febrile character, infectious in the highest degree, insidious in its attack, making considerable progress before any outward signs lead to apprehension on the part of ordinary observers. The appetite continues but little affected for the first three or four days, a dulness about the animal, a slightly heightened temperature of the body, (only perceptible, however, by the use of a thermometer,) and a somewhat rougher appearance of the coat being the premonitary symptoms. These are followed by shivering fits in the colder parts of the day, but they are unattended by the peculiar twitching of the muscles of the neck and flank observed in rinderpest. The

further progress of the disease is marked by entire loss of appetite, an increase of temperature over the body, now apparent to an ordinary observer, drooping ears, coldness of the extremities of the horns, ears and legs, evacuations indicative of defective digestion, pulse full, ranging from 60 to 80, and in occasional cases to 90, slight congestion of the lining membranes of the eyelids, and rumination only occasionally and imperfectly carried on. The last stage is ushered in with diarrhœa, the evacuations being of a very watery character, and in occasional instances commixed with blood. The pulse loses power, being almost imperceptible excepting at the heart, but continues unaltered in number, respiration becomes quickened, temperature of body suddenly falls several degrees below the healthy standard, patient becomes restless, weakened, often lying down, the eye sunken, the countenance anxious, the senses somewhat aberrant. Of the origin of this disease in Kaity, the only traces that I have been able to gather are that in Malleada, in the early part of May, the whole of the cattle (only twelve in number) were found to be sick. Not till the 12th of July, however, and then only from a private source, did information reach me of this outbreak which had by that time much extended, and I then communicated by telegram with the civil authorities, who had up to that time been kept in ignorance of the sickness. The cattle of Malleada so attacked were kept separate from those of other villages, but were still allowed to graze on certain land. Those of Kaity being afterwards taken to pasture on the same ground, contracted, I have no doubt, the disease in this manner. Here preventive measures to a certain extent were early adopted. Immediately on the disease making its appearance, the affected cattle were separated, and the healthy portion of the herd taken to Dodabetta. Of 140 animals so separated, 40 were driven further than the rest and kept isolated, and amongst these no sickness occurred, but with the remaining 100 the same care as regards isolation could not have been taken, inasmuch as in the course of a fortnight one case occurred, eventually the whole 100 were attacked, and 70 animals were lost.

Kandal, Ootacamund.

18. This sickness is now, I regret to state, extending to the village of Kandal, and a few cases have occurred in Ootacamund; but being on the spot at the very commencement of the outbreak, I trust that much may be done to check the malady. Where cases have been reported immediately on the animal sickening, the disease has been found to yield to treatment, but, as above stated, the insidious nature of this disease is such as readily to mislead any unpractised person, the later stages set in rapidly, and medicine can be of but little avail when the strength of the animal is exhausted and the disease at its height; even where the malady is checked, the patient will, in many cases, succumb from sheer weakness.

Difficulties in ascertaining nature of disease.

19. Having experienced difficulties in ascertaining, with any degree of certainty, the exact nature of a disease when first reported, and having, consequently, felt some hesitation in deciding which of several outbreaks, reported simultaneously from different parts

Questions to be answered to facilitate a decision being arrived at.

of the Presidency, should receive my first attention, I would beg to suggest the distribution of paper containing the questions below noted. If the answers to these be filled in and forwarded on the first appearance of sickness, it would much facilitate my arriving at a just estimation of the character of the malady, and enable me the better to come to a decision as to the necessity, or otherwise, of my presence on the spot.

Questions.

1. Name of district, talook and village.
2. Name of disease, Native or English.
3. Date of outbreak of disease.
4. Number of cattle attacked with the disease.
5. " of " died from the disease.
6. " of " recovered from the disease.
7. " of " remaining now sick.
8. " of " belonging to the village.
9. Is the disease infectious?
10. How supposed to have originated.
11. Describe the symptoms, giving information on the following points: external appearance of coat, rough and dull; skin tight, vesicular, or pustular eruptions; body hot, and extremities of horns, ears and legs cold; nose moist and cool, or hot and dry; eye dull or bright; animal dull and sleepy, or restless and wakeful; changes in quantity or appearances of urinary and fœcal evacuations; defluxion of mucus from nose; weeping from eyes; saliva from mouth; cough; quickened or labored breathing; color of lining membrane of eyelids, pale-pink, dark-red, or yellow; swelling of throat, or difficulty of swallowing; shivering fits.
12. Average duration of attack before recovery or death.
13. What preventive measures are used?
14. What medicinal treatment adopted, and, if so, with what result?

20. In conclusion, with reference to order of Government, 16th July 1867, No. 1578, I would beg to state that, in my opinion, it is very desirable that a veterinary surgeon should still be employed in inquiring into, and suppressing, the several different forms of cattle disease in this Presidency. I am confident that the greater number if not all these diseases are amenable to treatment, and it has already been clearly shewn that, where villagers understand and strictly carry out preventive measures, the utmost benefit is reaped. For any but an experienced veterinary surgeon to attempt to lay down a plan of treatment with any hope of success is impossible. In this country more than in England, the same sickness is found to vary so much, in some cases from difference of climate, in others at different seasons of the year, that even to attempt to lay down a fixed plan of treatment to be always adopted for a particular disease, would,

Reply to Order of Government regarding further employment.

in many cases, prove vain, inasmuch as varied symptoms must call for modified treatment. Again, I do not think that a veterinary surgeon doing regimental duty could give satisfaction either to himself or the Government, since delay must inevitably occur before he could reach the scene of outbreak, and, in many instances, it might happen that his services could hardly be dispensed with.

OOTACAMUND,
12th September 1867.

J. THACKER,
Veterinary Surgeon.

From the Collector of Coimbatore, to the Secretary to the Board of Revenue,—(No. 251, dated 24th September 1867.)

I have the honor to forward, for the information of the Board of Revenue, an original report of Dr. Thacker, on a late outbreak of murrian in Ootacamund and the neighbouring villages. The type of disease seems to have been most malignant; both cows and buffaloes have suffered.

2. A fair amount of success has attended the segregation of the sick animals from those not attacked.

From Veterinary Surgeon J. THACKER, *to the Collector of Coimbatore—(Dated Bangalore, 21st September 1867.)*

1. In reference to your letter No. 205, dated 18th July 1867, with enclosures, from acting special assistant collector, relative to reported outbreak of rinderpest at Kaity, I have now the honor to report the results of the inquiry and treatment.

2. The sickness is called by the people "kudinow," considered closely allied to "pytchinow," that form of rinderpest reported in your letter, dated 9th March 1866, No. 63. Some prominent diagnostic features differ in these two diseases, yet I consider them but variations or modifications, of one malady. The structures attacked, the highly contagious nature, the progress, duration, and fatality correspond with each other in both affections.

3. The disease broke out at Malleada, a village in the Kaity valley; these animals, twelve in number, were kept separated from contact with all others; but after their death, the cattle belonging to Kaity village were allowed to graze on the land where the sick had been daily driven, and thus the disease spread. For the Kaity cattle, 140 in number, preventive measures were attempted; 100 were removed to Dodabetta, 40 to a further distance; of the 100 all were eventually attacked and 70 died, while the herd of 40 entirely escaped. For future guidance I would point out that I consider the herd removed to Dodabetta should have been placed in kraals (containing from ten to twenty animals only) 200 yards apart, and attended by persons exclusively appointed to each particular kraal, and no communication allowed with each other.

4. The disease next appeared in Kandal and Ootacamund. The crowded state of cattle in sheds, the scarcity of buildings, the inability of many of the animals to withstand exposure to the prevailing monsoon weather, were grave obstacles to effectively segregating sick, and dispersing

the herds in which disease had appeared, the latter more difficult from the disease existing in places scattered and remote from each other. I am happy to state, nevertheless, with all these difficulties, that from the kind co-operation of your officers there, that the results were eminently gratifying. Of 660 cattle in the immediate vicinity, twenty-three cases occurred, and only twelve animals died.

5. In addition to these, however, the disease was contrcted by a herd of Todahs' buffaloes in the neighbourhood. On my immediate advice the animals, fifty in number, were removed to a secluded unfrequented place on the hills, placed in four kraals 200 yards apart, each detachment, with attendants, being perfectly isolated; the sick were removed and kept together by themselves: the result being that twelve only were attacked, nine died, and three recovered. Medicinal remedies were offered but declined, beyond the administration of a few doses; as there was a seeming want of confidence in their use, and as, under the exposure to the vicissitudes of the monsoon weather, I could not fairly hope for success in treatment, the attempt was not pressed upon them.

6. Having remained beyond the period of incubation of the disease without further cases occurring, I deem my further stay unnecessary, the disease being extinguished.

Resolved that the foregoing papers be submitted for the information of Government.

2. The first paper is Mr. Thacker's report upon his treatment of the cattle diseases which have prevailed in different parts of the presidency during the past six months, and the other is a special report to the collector of Coimbatore on the outbreak of a disease among the cattle in the Neilgherries with Mr Grant's remarks thereon.

3. The Board consider that Mr. Thacker has, upon the whole, been very successful. It is evident that the greatest difficulty under which he labors is the late date at which information as to the outbreak of disease usually reaches him. This, however, may easily be surmounted if all officers in charge of revenue ranges require an immediate report from their subordinates, in the form proposed by Mr. Thacker, when disease first appears among the cattle of any particular locality.

4. The Board propose that the range officer should communicate the report, with his own remarks, immediately on receipt to Mr. Thacker, forwarding a duplicate copy the same day to the collector. In emergent cases, when Mr. Thacker's immediate persence appears to be necessary, it will then be in the collector's power to communicate with him by telegraph.

5. The Board quite concur with Mr. Thacker in considering that his employment on his present special duty is highly desirable. They are of opinion that the valuable information which he is acquiring will eventually be of the greatest service in preserving the agricultural stock of the country on which the prosperity of the people so largely depends, and they are satisfied that each season the confidence in his system of treatment will increase, and its adoption will become more general.

Orders passed by the Madras Government, No. 2667, dated 12th November 1867.

The Government concur in opinion with the Board that Mr. Thacker's report is satisfactory, as indicating progress in combatting cattle disease and the growing confidence of the people in his mode of treatment.

2. Under the circumstances stated, Mr. Thacker's continued employment on this special duty is evidently desirable, as calculated to produce very valuable results to the agricultural class, so largely predominating in this country.

3. The Board will impress on the collectors the importance attached by Government to this investigation, and call on them to stimulate all their subordinates to furnish Mr. Thacker with the earliest and fullest information of the outbreak of disease as nearly as possible in the shape desired by him. Blank copies of the printed form of report, with headings in English and the vernaculars, and addressed to Mr. Thacker at his head-quarters, should be widely distributed in the talooks, and instructions given that one copy should be forwarded direct to Mr. Thacker, and a duplicate to the collector immediately on the existence of a well marked type of disease becoming known to the local officers.

4. The Government thank Mr. Thacker for the attention he has devoted to the subject, and for his report now submitted.

5. He is of course recording the results of his experience, and the Government request him, when in a position to do so, to draw up a short and simple manual describing the different forms of disease, the more prominent symptoms, the proper treatment, the suitable and most easily procurable medicines, and the appropriate doses, with such further observations as may appear to him calculated to check the originating and spread of disease.

6. A simple manual of this kind, translated into the vernaculars, and widely circulated among the people, seems calculated to produce results of the utmost value.

7. The Board will communicate Mr. Thacker's report to all Collectors.

From H. L. Harrison, Esq., *Junior Secretary to the Government of Bengal, to the Under-Secretary to the Government of India,* Home Dept.,—(*No. 713, dated 11th February* 1868).

I am directed to acknowledge the receipt of your letter No. 441, dated 31st ultimo, and in reply to forward, for the information of the Government of India, the accompanying copy of reports* from the Commissioner of Assam on the cattle disease which has prevailed in that division.

* No. 367, dated 9th October 1867, and enclosures. No. 441, dated 13th November 1867, and enclosures.

2. With reference to your letter No. 243, dated 17th idem, I am to state that Dr. K. McLeod, Civil Assistant Surgeon of Jessore, is preparing a report on the whole subject of cattle disease in the Lower Provinces, which will be shortly ready for submission to the Government of India.

Memorandum by COLONEL H. HOPKINSON, *Commissioner of Assam,—(No. 367, dated Gowhatty, 9th October 1867).*

Forwarded to the Secretary to the Government of Bengal, in continuation of this office letter No. 343, dated 21st ultimo.

From MAJOR T. LAMB, *Deputy Commissioner of Durrung, to the Commissioner of Assam,—(No. 612, dated Tezpore, 3rd October 1867).*

With reference to your letter No. 472, dated 24th August last, I have the honor to submit the following report on the cattle disease which has prevailed in the western mouzahs of this district since April last.

2. Observing in some of the reports which mouzahdars are required to furnish me with monthly on the general condition of the mouzahs that large numbers of cattle were being carried off by disease, which, from the extensive havoc it was committing, led me to suppose it was an epizootic, I therefore desired the Extra Assistant Commissioner at Mungledye to make enquiry and report on the subject, and at the same time asked the Civil Surgeon to depute a Native Doctor from Tezpore, in the direction of Laharbarree and Orang, where the disease had spread to, for the purpose of ascertaining its main symptoms, and such information as he might be able to collect respecting it.

3. The origin of it is a mystery. It seems to have made its appearance almost simultaneously in several mouzahs in the Durrung Mehal, and gradually to have spread as far east as the Gahroo; if the information furnished by Mr. Driberg and also the report of the Native Doctor are to be depended upon, the symptoms altered so much that by the time it had reached Chardoor, the disease had assumed quite a different form.

4. I beg to append copies of both the reports; you will not fail to perceive a great dissimilarity in them. The Native Doctor reports "no unsound state of the hoofs, nose, or mouth," whereas Mr. Driberg observes that the feet of the animals suffering from the disease are almost invariably sore; there is a discharge from the nostrils in some cases, and the tongue and throat become inflamed and swollen. If you will refer to Dr. Palmer's report, dated 7th October 1865, on the Calcutta epizootic of 1864, you will find the description given by Mr. Driberg answers to it in every particular. In the early stage,—refusal of drink and food, fœtid breath—saliva flows from mouth, diarrhœa sets in early, urine scanty and high colored, fever, tongue, and throat inflamed and swollen (which is considered by Dr. Palmer a distinguishing symptom, and one of great value in conjunction with the dribbling of fœtid saliva); in some instances dysentery and a species of cholera. The average duration of the disease is from four to fifteen days.

5. Large numbers of cows, swine, fowls, ducks, and pigeons, have been carried off this year. The mortality of cattle in the several mouzahs is shown in the accompanying statement.

6. I am happy to be able to say that the disease is now fast abating.

7. Some five years ago a similar disease carried off a large number of cattle in the district.

Statement of Cattle died in the Mouzahs of the District of Durrung.

Con. Number.	Names of Mouzahs.	Number of Bullocks and Cows.	REMARKS.
1	Orangam Majhat	1,406	Doubtful.
2	Gasooanun Shonapore	433	
3	Jorabaree	410	
4	Bansereea	311	
5	Bengbaree	264	
6	Ruttonpore	218	
7	Churcheelajhai	218	
8	Khatta Kooshee	206	
9	Dologaon	161	
10	Bheergaon	143	
11	Rungapanee	141	
12	Nazar Cooley	141	
13	Ombagaon	134	
14	Deepeela	134	
15	Cherrajoolee	125	
16	Shaikai	118	
17	Palooachoobree	103	
18	Burpalthai	100	
19	Cheepajhai	95	
20	Roynachooshee	92	
21	Dakooa	87	
22	Jhargaon	72	
23	Lakheraj	63	
24	Shoneygaon	62	
25	Chotochupoy	61	
26	Chilakamo	60	
27	Dologaon	52	
28	Doolachoobree	46	
29	Kotahee	46	
30	Papercooshee	41	
31	Tincorreea	40	
32	Aheena	40	
33	Kaligaon	40	
34	Chupie	39	
35	Dhalpatta	36	
36	Bezpara	35	
37	Kalilacooshee	27	
38	Beeheeagaon	24	
39	Burmoheea	24	
40	Horolee Mohunpore	22	
41	Hindoo Ghopa	21	
42	Lajorah	20	
43	Digirpar	20	
44	Chotootalah	20	
45	Atiaharee	20	
	TOTAL	5,971	

REVENUE OFFICE; }
ZILLAH DURRUNG, }
The 3rd October 1867. }

T. LAMB,
Deputy Commissioner.

From Dr. A. Imthurn, *Civil Medical Officer, Tezpore, to the Deputy Commissioner, Zillah Durrung,—(No. 50, dated Tezpore, 10th September 1867).*

With reference to your letter No. 469, dated the 22nd ultimo, I have the honor to submit the following information regarding the recent epizootic in the western part of this district. The Native Doctor, Sheikh Abdool Kadie, between the 28th ultimo and the 6th instant, visited the mouzahs Serajoolee and Sopai.

In the former mouzah eight head of cattle were found suffering with the epizootic; in the latter two.

The disease had made its appearance at the end of June last, since about the middle of August the cases had become scarce.

In the four villages of Chargong, Gendragoong, Chota Sopai, and Sopai, out of about 500 head of cattle, 172 head died during the last two months.

The symptoms of the epizootic,—numerous watery evacuations (without blood), prostration, death.

No unsound state of the hoofs, nose, or mouth, was perceptible. The disease lasted from one to seven days, in most cases, four days; no case of recovery was heard of.

From J. J. S. Driberg, Esq., *Extra Assistant Commissioner, Mungledye, to the Deputy Commissioner of Tezpore,—(No. 229, dated Mungledye, 13th September 1867).*

In reply to your memorandum No. 462 of the 22nd ultimo, I have the honor to submit the following report regarding the cattle disease which has been prevalent in several mouzahs of this sub-division.

This disease first appeared in April last, but as to its origin I am unable to report with any certainty. It does not appear to have travelled in any one particular direction, but to have broken out in different parts of the sub-division at or about the same time. As far as I am able to judge, the disease is contagious, and it is very probable that cattle already seized with the malady (though the symptoms had not shown themselves outwardly) were taken from one part of the district to another, and thus infected the cattle of the villages through which they passed. That the natives consider the disease to be of a contagious character is apparent from the fact that an animal, as soon as the disease shows itself, is separated from the rest.

The primary symptoms appear to be partial loss of appetite and great lassitude, and as the disease increases, the symptoms become more apparent.

In some instances refusal of food and drink takes place as soon as the disease shows itself, but in almost as many cases total loss of appetite does not occur until the third or fourth day.

The breath of the cattle attacked becomes fœtid. Saliva flows from the mouth, and fever in some cases supervenes; diarrhœa sets in early; in fact, this is one of the premonitory symptoms, and as the

disease increases, dysentery, and, in a few cases, a species of cholera sets in, the tongue and throat become inflamed and swollen, the urine is scanty and of high color, and in those cases that prove fatal, death occurs from four to fifteen days from the commencement of the disease.

In some cases an eruption, called "bossunt," breaks out on the body of the animal seized with the malady, and almost invariably sore feet and lameness accompany the symptoms I have described.

In appearance the animal from the earliest stages becomes heavy and dull, the eyes become inflamed, the hair of the body stands erect, and in some cases a slight discharge from the nostrils (which are generally inflamed) takes place.

The symptoms are in many respects similar to those noted on the reverse of your memorandum.

The above disease seems to be different from another complaint to which the cattle are subject, and which is termed "soboka." This disease is very common. The cattle are kept standing in liquid mud to cure the feet.

This disease is, however, seldom fatal, the mouth and feet become sore, and the hoofs crack, but by keeping the cattle in water they generally recover rapidly.

The proportion of deaths to those attacked are in round numbers about 18 per cent.

No. 4396, dated 30th October 1867.

Endorsed by the Government of Bengal.

Copy forwarded to Dr. McLeod, Civil Surgeon of Jessore, for information.

From Colonel H. Hopkinson, *Agent to the Governor General, North-East Frontier, and Commissioner of Assam, to the Secretary to the Government of Bengal,—(No. 441, dated Gowhatty, the 13th November 1867.)*

In compliance with the request contained in paragraph 2 of your office letter No. 4319, dated 24th ultimo, I have the honor to forward, herewith, copies of the enclosures of my letter No. 343, dated 21st September last.

From Major T. Lamb, *Deputy Commissioner of Durrung, to the Commissioner of Assam,—(No. 456, dated Tezpore, the 19th August 1867.)*

With reference to Board of Revenue's letter No. 2157, dated 26th ultimo, received with your office memorandum No. 34, dated 3rd instant, I have the honor to state that the prospects of the crops, both

assoo and salee, seems hopeful from the reports of the mouzahdars received since my last report of the 8th idem.

There has been great mortality amongst the cattle in some of the western mouzahs of the district, which has interfered with the ryots ploughing to some extent.

From A. C. Campbell, Esq., *Personal Assistant to the Commissioner of Assam, to the Deputy Commissioner of Durrung,*—(*No.* 472, *dated Gowhatty,* 24*th August* 1867.)

Referring to your letter No. 456, dated 19th instant, I am directed by the Commissioner to request that you will submit a special report on the mortality which you say has taken place amongst the agricultural cattle of the western mouzahs of your district. In this report you should specify the number that died in each mouzah.

From Major T. Lamb, *Deputy Commissioner of Durrung, to the Commissioner of Assam,*—(*No.* 470, *dated Tezpore,* 22*nd August* 1867.)

With reference to the concluding paragraph of this office report on the crops of this district, dated 20th instant, I have the honor to inform you, that from enquiries I learn, that the cattle disease is very prevalent, and that in some parts of the district so large a number of cattle have died as materially to interfere with the salee rice cultivation.

I have called for special reports from Mr. Driberg and the mouzahdars where the disease has appeared to any great extent, and requested the Civil Surgeon to depute a Native Doctor to make enquiries and treat some of the diseased cattle, as he would be in a better position to collect information as to the origin, symptoms, and progress of the disease, than the illiterate mouzahdars. I trust this will meet your approval.

The Natives have discovered no remedy whatever for the malady, which appears to bear a very close resemblance to the epizootic of 1864 in Calcutta.

From Major T. Lamb, *Deputy Commissioner of Durrung, to the Commissioner of Assam,*—(*No.* 506, *dated Tezpore,* 2*nd September* 1867.)

With reference to the Board of Revenue's letter No. 2157, dated 26th July last, received with your memorandum No. 34 of the 3rd ultimo, I have the honor to inform you that the reports received of the assoo and salee crops are favorable.

The reports alluded to in this office letter No. 470, dated 22nd idem, regarding the great mortality amongst the cattle in some of the mouzahs of this district, which have been called for from the officer in charge of the Mungledye Sub-Division, and Civil Surgeon, have not yet been received. From the mouzahdars' reports it appears that 3,511 cattle (plough bullocks and cows) have died in the western mehals during the last two months.

From H. L. Harrison, Esq., *Junior Secretary to the Government of Bengal, to the Under-Secretary to the Govt. of India,* Home Dept.,—(*No.* 1152, *dated 2nd March* 1868.)

In continuation of paragraph 2 of the letter from this office No. 713, dated 11th ultimo, I am directed to forward herewith, for submission to His Excellency the Governor General in Council, a copy of each of two reports on the epizootic diseases of cattle in Lower Bengal by Dr. Kenneth McLeod of Jessore.

2. A volume of selection of papers on the same subject from the records of this office is under preparation, and will be forwarded for the use of the Government of India as soon as it is ready.

From Kenneth McLeod, Esq., a. m., m. d., *Civil Assistant Surgeon of Jessore, to* H. L. Harrison, Esq., *Junior Secretary to the Government of Bengal,*—(*No.* 655, *dated Jessore,* 13*th November* 1867).

I have the honor to forward my paper on cattle diseases.

2. I send two compilations, one of a more detailed and the other of a more concise description.

3. In the first, I have gone as thoroughly into the subject as I could. Having determined upon a definite plan of writing, every fact of importance which I found in the papers submitted to me by Government, or in other records which I had access to, is put down in its proper place.

4. By arranging all the numerous references in numerical order, in a consecutive list, I have been enabled, by simply quoting their number on the list, to effect a great saving of space, and to show what authority or authorities I have for my statements.

5. In composing this paper I have made as much use of scientific terms and digressed as much into scientific discussion as I considered necessary to render the subject as complete as possible.

6. From the information placed at my disposal, I have been enabled to draw up a tolerably accurate and complete account of the epizootics which are destroying the cattle of Bengal, and when any points are doubtful or require investigation (and less remains to do in this direction than I anticipated), I have indicated them pointedly.

7. The shorter paper was written after the longer was completed, and is that which I have composed for translation.

8. It contains the essence of the other paper without reference or discussion, and is a simple exposition of the subject in unscientific and plain language, with plain rules for treatment.

9. In order, however, to render the pamphlet as practically useful as possible, I have in three pretty lengthy appendices given—

(*a*).—A short statement of the nature, symptoms, and treatment of the principal diseases of cattle ;

(*b*).—A list of the best medicines, their actions, uses, and doses, distinguishing those that can be had in native bazars ; and

(*c*).—Eighty-six simple prescriptions, arranged according to the action of their principal ingredient, also distinguishing those which can be had in bazars from the rest, and giving native names, weights, and measures.

10. I have thus spared no pains to carry out the design of Government, as communicated to me in your letter No. 3751 of 3rd September 1867. The labor expended on the compilations has not been slight, and I have endeavoured to be as accurate and complete as possible.

11. The longer paper might, perhaps, be interesting and useful as a distinct publication in English, besides constituting a record of all that is known on the subject up to date in an accessible form. You will, however, be better able to judge of what ought to be done with them after perusal.

On the Cattle Plague of Lower Bengal, by KENNETH McLEOD, A. M. M. D., *Assistant Surgeon, Her Majesty's Indian Army.*

Of late years the attention of the Government of Bengal has been drawn to the losses which are sustained every year by diseases affecting cattle. Hundreds of cattle are yearly swept away throughout the presidency, and when any of these dreadful visitations appear in a district, the cultivation of the crops is very seriously impeded. This is owing not only to the scarcity of cows which ensues from the great majority having died from disease, nor from the difficulty which a poor ryot who has been deprived of all his cattle finds in buying others to take their place (and this he can only do by obtaining loans from mahajuns, sometimes at an exorbitant rate of interest), but also to the rise in the price of cattle, which in some places amounts to ten times as much as it was before the plague appeared. Magistrates of districts have reported this state of matters, and it is well known that after a season of severe cattle disease the crops of next year are deficient. This causes much suffering and hunger. It is, therefore, a matter of the utmost importance to the inhabitants of the Presidency, the majority of whom depend so entirely on the state of the crops from year to year, and a matter of great concern to Government, whose interest is theirs, to endeavor to ascertain, as far as possible, the causes of this disease and mortality among cattle, and the conditions on which its appearance and spread depend, in order that these causes and conditions may be obviated; the symptoms of the diseases, in order that they may be recognized and properly treated; and the modes of treatment that have been found most successful, in order that when the diseases do appear, as great a number of cattle may be saved as possible. It is with these ends in view that the following pamphlet, containing in short all that is known upon the subject, has been, at the request of Government, compiled for circulation.

I. *History of Cattle Diseases in Bengal.*—It is difficult to fix the time when these diseases first made their appearance in the presidency. There are records of severe cattle disease having prevailed in 1817 (B. C. 1222), in 1824 (B. C. 1229), 1836 (B. C. 1241), and 1853 (B. C. 1258). In some districts they are known to have prevailed from the earliest recollection, and in others, persons writing in 1864 (B. C. 1269), state that they have prevailed for 20 or 30 years previously. The attention of the Government of Bengal was drawn to the subject in 1863 (1268) by the Government of Madras, in which presidency severe

cattle disease have prevailed. Reports were called for from Commissioners, who received numerous letters from Magistrates. These contain the information derived from Deputy Magistrates, Civil Surgeons, Zemindars, European and Native, and Goallas, and the substance of the information so collected was published in the *Calcutta Gazette* of 12th March 1864. In January 1864 (Magh 1269) a very severe and fatal outbreak of cattle disease appeared on the occasion of the Exhibition at Alipore. This further arrested the attention of Government, who commissioned Dr. Palmer to investigate the subject. This gentleman presented a very full and interesting report in March 1865 (Choyt 1270), which was circulated to Commissioners, Magistrates, and Medical Officers, with a request for further information. The request was amply responded to, and during 1866 (B. C. 1271) a great number of highly interesting reports were forwarded from all parts of Bengal. The whole of the information thus obtained will be concisely and methodically set forth in the following pages. All diseases of cattle will not be discussed. Attention will be directed to those only which, like cholera and fevers among men, break out amongst cattle, and carrying away large numbers, attack first one place and then proceed to another, rage virulently for a time, and then die out. These diseases are called epizootic diseases.

II. *The varieties of these diseases and the names by which they are known.*—It would be a highly important matter if the same diseases had the same names in the different districts of the presidency. This is not the case, and it is difficult, from the imperfect descriptions given by those not skilled in diseases of cattle, to know sometimes what disease in one district corresponds to what disease in another district, when the names are not the same. An exact description of a disease under the name by which it is known in most districts ought to remove this difficulty, and it is hoped that there will henceforth be no difficulty in recognising the diseases treated of in this paper under their most common names.

The cattle diseases which affect numbers of animals simultaneously in Bengal are of two classes :—

A.—In one there is an eruption observed on some portion of the skin ; and

B.—In the other there is no such eruption to be seen.

1. In the former class we find a very common disease affecting the hoofs and mouth of cows, and though not very deadly, attacking great numbers of animals, laming and temporarily disabling them. This disease is called in different places *Khorah*, *Khoraha*, *Khoorea*, *Zairkhara*, *Khurpakka*, *Khoratileh*, *Khoratie*, and *Homsa*. Its existence has been reported from the districts of Shahabad, Tirhoot, Rajshabye, 24-Pergunnahs, Jessore, Cuttack, Hazareebaugh, Loharduggah, Midnapore, and Backergunge ; but it is probable that it is known everywhere throughout the presidency, and may have other names than those above enumerated. I shall in the sequel always call it *Khorah*.

2. There is another disease with an eruption appearing upon the body accompanied with more severe sickness, and in every way more

serious and fatal, which, from its resemblance to the small-pox of man, is called *Gootee*, *Boshonto*, *Mata*, *Chechack*, *Sitala*, *Mardrishti*, *Takrooni*, and *Markhee*. This disease is known everywhere in Bengal under one or more of the foregoing names.

In writing about it I shall always call it *Gootee*.

3. There is another disease without any eruption on the body which, when it breaks out among cattle, is fearfully infectious, rapid, and fatal. This disease is most commonly called *Puschima*, or *Puschima Rog*, or *Puschima Nara*. It appears also to be called *Dukuha*, *Hengha*, *Waghah*, *Dosalin*, *Jor*, *Burrapera*, *Hureena*, *Hurna*, &c., and is known best in the districts of Nuddea, 24-Pergunnahs, Jessore, Burdwan, Hooghly, and Howrah, and apparently also in Patna, Sarun, Rajshahye, Rungpore, Bograh, Midnapore, Pooree, Nowgong, and Darjeeling. I shall always call it *Puschima*. These are the three best known and most minutely described diseases affecting numbers of cattle. It is from these that by far the greater number of animals which die every year in Bengal are lost. Other diseases are comparatively rare and unimportant. This paper will therefore be confined to a minute consideration of them, and from the exact description of their symptoms, which a study of so many intelligent reports has enabled me to give, other varieties of disease can be separated and studied. In Appendix A I shall place a short description of the most important diseases of cattle and their treatment, and in Appendix B I shall enumerate the principal medicines and their doses used in the treatment of all diseases of cows. At present our concern is with Khorah, Gootee, and Puschima only.

III.—*The mode in which these diseases appear and spread in localities.*—The following facts are well ascertained under this head :—

1. During the season when these diseases are apt to prevail, or in the neighbourhood of places in which they do prevail, mild cases are frequently observed.

2. Before the diseases break out with force, a few cases may be seen here and there of a mild description.

3. When the disease breaks out, first one cow and then many cows are affected.

4. The cases which occur at first are more severe and fatal than those which occur towards the end of the outbreak.

5. These diseases appear to prevail principally among herds of cattle, especially if they are crowded together.

6. After the disease disappears from a place, cases of a mild description occur here and there.

7. These diseases visit places after an interval of one to ten years.

8. When they do break out they rage in a place for about three months.

9. During the prevalence of the diseases, while most places and cattle are visited and attacked, some escape.

10. Severe disease is sometimes preceded or succeeded by a milder form of disease.

11. Sometimes the disease is observed to spread in a particular direction, and it has been most frequently noticed to travel eastward.

12. In many cases severe disease among cattle and men have raged together in the same place at the same time.

13. Besides cattle, other animals are observed to suffer from similar diseases, buffaloes, sheep, goats, deer, pigs, fowls, pigeons, and ducks.

14. It has often been observed that diseased cows carry the disease to a healthy locality and infect others.

15. A place that has once suffered from any of these diseases, if visited again within a short time, does not suffer so much.

16. The laws of origin and spread of the diseases treated of are similar to those of some human diseases, such as cholera.

IV.—*The causes of these diseases.*—These are of two kinds :—

A.—The causes and conditions that dispose some animals to be affected by them, and more severely than others ; and

B.—The causes that immediately give rise to the disease in the body.

A.—Of the first class,—

1. *Season of year* holds an important place. From very many statements it appears that while these diseases are apt to occur during the whole year, they are most virulent and fatal in the cold and hot seasons, and less prevalent in the rains. With regard to the particular diseases, Khorah seems to be most frequent during and after the rains, Gootee in the hot weather, and Puschima in the cold months.

2. The state of country, soil, and atmosphere, which seems to give origin to and favor the spread of these diseases, is a moist soil liable to inundation with fresh water, low-lying, and level, moist warm atmosphere, and great heat.

3. Cattle fed on coarse grass, old straw, or grazed on pastures which have been recently under water, are more liable to take these diseases, and take them more severely than those which are fed on good straw, chopped and soaked, dry pastures, or fine grasses. Dirty water also predisposes to disease.

4. Cows in bad condition are more liable to be affected than those in good condition, unless the disease is very virulent, in which case there appears to be no selection.

5. The age or sex of the cow do not appear to have much effect predisposing to disease or otherwise.

6. Cattle over-crowded, kept in damp houses, ill-cleaned, over-worked, not properly rubbed dry after getting wet or perspiring, and ill-fed and watered, are more liable to be attacked than those housed and treated with care.

B.—The exact cause of these diseases has not been as yet found out, but—

1. There is every reason to believe that it is a poison, generated under peculiar conditions of soil and atmosphere which enters the

animal with the air, food, or drink, causes a certain disease, and having been multiplied in the body, is evacuated by and among the discharges. Other animals are apt to be affected by the breath or discharges of a diseased animal, and the air, water, grass, straw, or even man, flies, birds, dogs, or jackals may carry the poison from one to the other. This is the most probable explanation of the way in which these diseases appear and spread.

2. There can be no doubt of the fact that one animal is capable of imparting these diseases to one or many others, and the way in which this may happen will be understood from the preceding paragraph.

All the medical men who have described the diseases, and many of the magistrates, zemindars, &c., consider it infectious in the highest degree.

V.—The symptoms of Khorah, Gootee, and Puschima.—In all these diseases there is more or less fever, and there are besides certain symptoms of a local kind peculiar to each disease.

1. In Khorah there is generally very slight fever, and in most cases the *lameness* and soreness of the mouth are the only symptoms noticed. The *lameness* is caused by an eruption between the hoofs, and a similar eruption may be observed inside the mouth. The eruption consists of little bags of watery fluid which rise on the skin. These burst and an ulcer or crust forms. The danger of this disease is, that from want of proper care the ulcers of the foot and mouth may become large, or flies may attack them, maggots form, the legs become swollen and rotten, and the animal die in consequence. The water that comes out of the mouth of animals suffering from this disease is sufficient to give rise to it in others, and the symptoms appear in about two days after the cows have eaten straw which has been soaked in the saliva of diseased animals.

When the disease is severe, the animal refuses food; becomes thirsty, does not chew the cud; has a hot, dry, and rough skin, and a tender udder. The milk is diminished in quantity, the urine becomes high colored, the eyes and mouth water, and diarrhœa may come on. The eruption may also appear on other parts of the body, the udder, neck, &c.

There are then two forms of the disease, one mild with only local symptoms, and another severe with symptoms of constitutional disturbance besides; the disease lasts from ten to fifteen days, and if proper care and correct modes of treatment are adopted, few animals will die.

2. Gootee is a much more formidable and fatal disease. In most cases there may be three stages of the disease distinguished.

1st.—A period of sickness before the disease breaks out severely;

2nd.—A period of fever; and

3rd.—A period when eruptions appear on the skin, or the bowels become affected, or both effects ensue.

1st.—During the first period, which lasts two or three days, the cow is observed not to be so lively as usual, to stand apart from the rest

and not to feed so heartily. The eye looks dull, the animal generally looks ill, and is either restless or disinclined to move. The milk also diminishes in quantity. The skin looks dry and rough, and sometimes there is a cough. It is extremely important to note these symptoms, because they will at once suggest the propriety of removing the animal from among the healthy.

2nd.—The second stage lasts also two or three days. At its commencement the animal frequently shivers violently, and now the disease begins in earnest. The following symptoms may be observed during the stage—

1. Increased heat of skin, ears, horns, &c.
2. Roughness of skin, erection of hair and dropping back of ears.
3. Increased rate of pulse and breathing.
4. Complete refusal of food.
5. Absence of rumination.
6. Intense thirst.
7. Inflammation and watering of eyes.
8. Discharge of watery matter from mouth and nostrils.
9. Dry muzzle.
10. Cough occasionally.
11. Swollen tongue.
12. Scanty red urine.
13. General appearance of great distress.
14. Diminished or suspended milk.

3rd.—On the second or third day from the beginning of the second period, the bowels become loose, and slimy watery stools, in which blood soon begins to appear, are passed frequently,

On the fourth or fifth day eruptions of vesicles succeeded by crusts appear on the whole body or on some part of it. The whole skin, mouth, and hoofs should be carefully examined for these eruptions during this stage; sometimes however they are absent altogether. The hair of the skin close to the eruptions can be rubbed off, and when the eruption is copious, the whole of the hair can be removed. During this period the animal is apt to sink from prostration, the fever leaves, and the skin becomes cold. The discharges become brown or yellow, and begin to smell badly. The feet become cold, ulcers are prone to form in the mouth and skin, the throat may become swollen and ulcerated, the tongue increases in size. The stomach sometimes swells from wind, and the animal eventually lies down and dies.

The whole disease lasts about eight days, and if the animal recovers, it takes fifteen or twenty days to do so.

It is a very common and fatal disease, hundreds of cattle are killed by it every year, and when it breaks out in a flock, few cows escape seizure, and of those affected, not more than one or two in twenty escape death.

Besides the symptoms described there may be—

1st.—Severe cough and pain in the chest from inflammation of the lungs.

2nd.—Pain in the stomach from an excess of dry food in it.

3rd.—Swelling of the stomach from wind.

4th.—Ulcers or maggots on the skin or throat.

3. The symptoms of *Puschima* are very like those of *Gootee*. It is a more severe disease, kills more and sooner. As the stages and symptoms are so similar in both diseases, it will be unnecessary to repeat them in detail, and it will be sufficient to point out the principal points of difference.

1st.—The fever is not so strong in Puschima as in Gootee, and it goes and comes, the body being alternately hot and cold. There is also a greater tendency to coldness in the extremities and along the spine of the back than in Gootee.

2nd.—The looseness of the bowels comes on sooner; sometimes as early as the second day from the date of the shivering or commencement of the fever, and it is sooner followed by a discharge of blood. The stools are more liquid and fœtid than in the last disease.

3. The other discharges begin sooner to lose their clearness in Puschima, and the breath smells stronger and sooner than in Gootee.

4. The throat is sore in Puschima, it is more apt to swell externally than in Gootee; the tongue also becomes red and swollen.

5. There is no eruption upon the skin in Puschima. Every case of Gootee, however, which dies without an eruption, must not be called Puschima, because if a cow dies before the fourth or fifth day in Gootee, there can be no eruption, and many cases which live longer do not exhibit any skin eruption. The character of the disease is to be determined from the general symptoms of the disease as observed in many animals.

6. There are twitchings of the muscles in Puschima and none in Gootee.

7. The duration of Puschima is shorter (average four days) than of Gootee (average eight or nine days).

8. This disease is equally infectious with the last and more destructive. A greater number of the cattle attacked die of it (about 90 per cent. of those attacked).

With these reservations the description given of Gootee will apply exactly to Puschima.

From the preceding account of these diseases it will not be found difficult to distinguish between them.

The eruptions inside the mouth and in the cleft of the hoof, in either or both places, with slight derangement of general health, should distinguish Khorah from all other diseases. Severe cases of Khorah sometimes resemble slight cases of Gootee and the reverse. As far as regards treatment, it is not of great importance to be very accurate in naming such cases, though the general character of the disease in the majority of cases affected will led to a knowledge of which disease is actually present. Gootee is determined by the more severe disturbance of health, higher fever, more severe bowel complaint, and the

eruption being general. Cases of Gootee occur, however, which it is difficult to distinguish from Puschima, in which the animal dies of severe constitutional disease without any eruption on the body. Here again the disease should be named rather from the nature of its manifestation in the majority of cases than from any individual case. A case should not be called Puschima, because there has been no eruption, if most cows affected show an eruption, nor should an eruption on the body in any case constitute that Gootee, when the outbreak is plainly one of Puschima. In estimating the probability of the issue of the case, the following points should be borne in mind:—

1st.—In Khorah the absence of constitutional disturbance, and of ulceration and swelling of the foot are good signs, and the existence of disorder of general health, and of ulceration or swelling of the foot are bad signs, and suggest greater caution in treating the case.

2nd.—In Gootee we form an opinion on the extent of the eruption and severity of the constitutional symptoms.

A copious eruption is a good sign.

A slight eruption with severe diarrhœa is a bad sign.

The earlier the diarrhœa and dysentery appear, the worse the discharges smell; the greater tendency the body has to cool; the more unfavorable our opinion of the case, and the reverse.

3. In Puschima our opinion must depend altogether upon the character of the constitutional symptoms.

If the diarrhœa sets in early and is soon followed by dysentery, if the discharges smell badly, if the body has a tendency to grow cold, and the febrile stage is very short, then the probability of the case proving fatal is very strong. If the body retains its warmth, the discharges are not very fœtid, and the diarrhœa and dysentery are mild, then the hope of recovery is stronger.

Swelling of the throat or stomach are bad signs, and evident pain in the chest or belly give evidence of some complications which diminish the chance of recovery.

VI.—*The appearances observed in the internal organs after Death.*—When the body of the cow is opened in Gootee and Puschima, the state of the internal organs is found to be very much the same.

1. The blood in both diseases is seen to be black and thick, and in the heart solid lumps are frequently found.

2. The whole of the inside of the mouth, throat, stomach, and intestines, is inflamed and covered with ulcers.

In the stomach is frequently found food hard, dry, and powdered pressed together in hard plates. This is the cause of death in very many cases.

3. The lungs are sometimes found to be inflamed, and the lining membrane of the windpipe also swollen and red.

4. The spleen and the liver are sometimes found to be swollen and filled with blood.

These are the principal appearances observed. They indicate a very severe form of disease of the febrile kind.

VII.—*The nature of these diseases.*—The symptoms of disease observed during life and the appearances observed after death, leave no doubt that Khorah, Gootee, and Puschima are fevers accompanied with an eruption of the skin or otherwise. They exactly resemble no disease of man, but are somewhat like several, as small-pox, some fevers and the plague. None of them are the same as the small-pox of man, and they have different symptoms from cholera.

They are in all probability caused by a poison which is derived from the soil in certain states of it, or from other animals suffering from the same disease. This poison enters the body of the animal by the nostrils or mouth, and after a certain time signs of sickness appear. The animal first becomes disordered, then, as the action of the poison becomes more intense, a state of fever arises; then, the system attempting to throw off the poison by the skin or bowels, these become affected with inflammation or actually ulcerated, and from the effects of these processes upon the system exhaustion and death ensue.

According to the strength of the poison, the effects will be more or less severe, and there is some reason to think that these diseases are caused by a poison of the same kind in different degrees of strength.

VIII.—*Treatment.*—Before entering upon the details of treatment, there are a few obvious truths which it would be well always to bear in mind.

1. It is infinitely better and easier, if that is possible, to prevent cattle from having these diseases than to cure them when they have got them.

2. When any of these diseases break out among cattle, a certain proportion of deaths must be expected; our object is by taking advantage of every means in our power to promote recovery to render the loss as slight as possible.

3. Failure of any plan of treatment in one case does not prove that it may not succeed in another.

4. It is only by trying different means of treatment with perseverance and hope, and by comparing these with each other, that we can determine which is best and most successful.

5. The more we know of diseases and of the actions of medicines the better we can cure the former and apply the latter.

6. In order to know and be able to do as much as possible, it is incumbent upon every one to observe the characters of diseases as much as possible and the actions of medicines, and to communicate any new observations or facts to others.

These truths will command general assent.

In order to give the most complete view of the treatment of these cattle diseases, I shall state—*first*, what means ought to be taken to improve the condition of cattle so as to render them as little liable to disease as possible, and better able to stand it if it comes; *second*, if the disease is in the neighbourhood, what means should be adopted to

prevent its access to a place; *third*, if it does appear in a place, what means should be taken to prevent its spreading and seizing on all the cattle; and *fourth*, what medicines it is proper to give in each kind of disease to assist recovery.

1*st.*—What ought to be done to keep cattle healthy and in good condition?

For this purpose the following points demand particular attention:—

(*a*). The *breed* of cattle should be improved by getting strong bulls from a different flock and of a good stock, and preventing the bulls of the flock itself from covering; by preventing bulls from covering too young; by feeding calves well, and not beginning to work them too early.

Breeding should be preferred to purchasing cattle, because it diminishes the chance of introducing disease.

(*b*). The *food* of cattle should be carefully studied. The grass which springs up in the early rains is injurious.

Pastures that have been recently inundated are poisonous.

Coarse grasses with thick stems are bad.

Fine dry pastures are most suitable for grazing cattle.

Paddy straw carefully dried and stacked, and meadow hay preserved in the same manner, are the best food for ordinary use; these should be chopped up and moistened.

If the cattle are worked, gram, dhan, oil-cake, or coarse peas should be given in small quantities. Chopped plantain stocks and young leaves are nutritious when nothing else can be got.

(*c*). The *houses* of cattle should be made a matter of care.

They should be large enough. It is the worst thing possible for cattle to crowd too many in the same house.

The floor should be dry and raised above the ground with dry earth, sand or bamboos; they should slope to the outside to allow fluid to run off.

The roof should not admit rain, and openings should be left in the walls for ventilation.

The floors of cattle sheds should never be wet or muddy.

(*d*). The *water* which cattle drink should be clean. Old tank and bheel water is poisonous. Water for cows should be drawn from rivers or clean tanks.

(*e*). *Cleanliness* should be carefully attended to. *Dung should be* removed daily and heaped at some distance from the cow-house. Dry clean straw should be given for a bed every night.

(*f*). In *working* cattle care should be taken not to over-work them; not to work them too long without food; four hours at a time is enough; to rub their skins dry with straw if they get wet or perspire, and to proportion the work to the age and constitution of the animal.

The value of cattle to the zemindars and ryots of this country is well known, and if they are worth having, they are certainly worth being taken care of, especially as neglect of any of the points above enumerated renders them more liable to catch disease and less capable of resisting it when it comes.

2nd.—When cattle disease is in the neighbourhood—

(*a*). The greatest care should be taken to prevent infection by keeping cattle away from public roads and routes of travel, and refraining from buying and selling.

(*b*). The housing, cleanliness, food and drink of cattle should at such times be more particularly attended to.

(*c*). All communication of every sort with infected places should be suspended.

(*d*). Hospitals (kutcha) should be constructed in secluded places in case of their being required.

3rd.—When the disease actually appears—

(*a*). All the sick cattle should be placed apart from the rest in kutcha hospitals, and the straw, &c., which they came in contact with should be burnt.

(*b*). The healthy cattle should at once be removed to places several miles away where no disease is known to exist.

(*c*). If disease follows them there, then the sick and healthy should be again separated and the latter removed again; this should be repeated till the disease disappears; large herds should be split up into smaller sections.

(*d*). All straw, bamboos, grass, &c., in contact with sick cattle should be burnt, and their dung carefully buried or burnt with the straw.

(*e*). All carcases of cattle should be carefully buried at least three feet (two haths) below the surface.

(*f*). The hides should never be removed from the carcases but buried with them.

(*g*). When a cow recovers, it should be washed carefully with soap and water.

(*h*). Sick cattle should never be permitted to remain on a pasture, as their saliva and dung is poisonous.

(*i*). Before the healthy are brought back to a village, from which by these means the disease has disappeared, everything that has been in contact with the sick should be burnt, and some time should elapse before the cattle are brought in.

These rules are based upon experience, and many instances are reported where the adoption of these rules saved many cattle from infection. The carrying out of them involves some trouble, but what is that in comparison with the value of the stock saved?

There is no other method of preventing the spread of these diseases, and when experience has proved the value and efficacy of these directions, they should be adopted without hesitation.

On this point there is no need for further trial or experiment. The advantages of the plans recommended have been proved over and over again.

4th.—It now remains to point out what method of treatment is suitable in the different diseases already treated of.

A.—In *Khorah* the eruptions and ulcers demand the attention more than the general disease.

(*a*). The most common method adopted in this country is to keep cows standing in water or soft mud; this prevents the flies from

attacking the sores, and cures the great majority of cases. It must be done thoroughly and continuously, if done at all. The eruptions and sores should at the same time be washed with a lotion which may consist of—

Alum (Phitkerie)	$\frac{1}{2}$ chittack.
Water	1 seer.
Or Borax (Sohaga)	1 chittack.
Water	1 seer.
Or Salt (Lobun)	2 chittacks.
Water	1 seer.

(*b*). If the water or mud method is not convenient, the feet should be *carefully* washed and tar (alkatra), kurrunj oil, camphor (kafoor), and linseed oil (moshiner tel), as much camphor as will dissolve in the oil with the aid of heat, or sulphate of copper (tootea) and treacle (khar) (Appendix C. No. 72) should be applied to the eruption or ulcer with a bit of cloth tied to the end of a stick.

(*c*). A slight purge should be given—

Epsom salts (sats)	4 chittacks.
Salt (lobun)	4 "
Powdered Ginger (soot)	1 "
Water (jol)	1 seer.

(*d*). If there are febrile symptoms, watering of nose and eyes, heat, &c., the following can be administered:—

Black antimony (soorma)	$\frac{1}{2}$ tolah.
Black salt (karee lobun)	1 "
Nitre (shora)...	$\frac{3}{4}$ "
Sulphur (gundruck)	2 "

To be given in one seer of rice water, or boossie and water, twice a day.

(*e*). If the ulcers are large, alum (phitkerie) should be dried and powdered and sprinkled on them, and they should subsequently be washed with indigo water (nil jol), or neem water (neem jol), or sulphate of copper, or alum water.

If the ulcers become unhealthy they should be burnt with arsenic (shenko beesh), corrosive sublimate (roshkopoor), either alone or mixed with each other, as much flour (soojee), or nitric acid (shora er drapoc), or nitrate of silver (kastic), or sulphate of copper (tootea), and then treated with alum and water or any of the lotions above given.

(*f*). If through carelessness maggots (kirmi) form, they should be carefully extracted, the swelling should be poulticed with boossie and powdered charcoal (koela) and camphor (kafoor) and oil of turpentine (tarpentel) and oil frequently applied.

If these directions are carefully attended to few cattle will be lost from *Khorah.*

B.—In *Gootee* the constitutional disease is of more importance than the local eruption.

(*a*). One gentleman (Mr. Piddington) has strongly recommended the following plan of treatment for curing the sick and preventing the healthy from taking the disease.

The sick and healthy cattle are locked up in separate houses with all the doors closed; a plateful of common salt is placed on the floor and half a chittack of strong sulphuric acid (gundruck er drapoc) and poured on it. Very irritating fumes arise. The person pouring on the acid must go out of the house at once and not breathe this

white smoke; the windows and doors are kept shut for eight or ten minutes and then opened; the white smoke causes the cattle to cough, but is said to cure them. This should be repeated morning and night for a few days (three or four). If these means can't be adopted, the smoke of green wood is a good substitute, but when they can be adopted, they should certainly be tried.

(b). Another plan is strongly recommended by Captain Chambers, namely, the administration of half a chittack of black salt (karee lobun) to the sick twice a day, and one-fourth chittack twice a day to the healthy. This may be tried, but the other precautionary measures detailed under the second and third sections should not be neglected.

(c). Another gentleman (Dr. Jackson) found the application of croton seeds (joipal er beesh) in the form of an ointment to the side so as to excite profuse suppuration, cure the only four cattle in which he tried the plan.

Both these methods may be tried.

(d). In the febrile stage a purge should be given—

Common salt (lobun) ...	½ to 1 seer.
Rice-water or boossie and water ...	2 seers.
Or Epsom salts (sats) ...	4 chittacks.
Sulphur (gundruck) ...	2 "
Ginger (soot) ...	½ chittack.
In one seer of rice-water, &c.	
Or linseed oil (moshiner tel) ...	½ seer.
Oil of turpentine (tarpen tel) ...	1 chittack.
Croton oil (joipal er tel) ...	10 phuttas.
Given slowly.	
Or aloes (mosubber) ...	⅓ chittack.
Soda (sujeemuttee) ...	½ "
Boiling water ...	1 seer.

Any of these may be given in order to produce a copious stool, which assists in carrying off the poison.

The following should be occasionally administered:—

Black antimony (soorma) ...	½ tolah.
Sulphur (gundruck) ...	¼ chittack.
Nitre (shora) ...	¼ "
Black salt (karee lobun) ...	½ "

In beer, rice-water, &c., one seer twice a day.

(e). In the third or eruptive stage, the bowels should be treated with soothing and slightly astringent medicines—

Camphor (kafoor) ...	½ chittack.
Cannabis (bhang) ...	2 chittacks.
Catechu (khoyre) ...	½ tolah.
In rice-water, gum-water, &c. ...	1 seer.
Chalk (karee muttee) ...	1 tolah.
Or galls (maju phul) ...	1 "
Opium (afeem) ...	15 ruttees.
In rice water, gum-water, &c. ...	1 seer.
Camphor (kafoor) ...	½ tolah.
Or cheretta (cheretta) ...	½ "
Ginger (soot) ...	2 tolahs.
Bhang ...	2 "
In rice-water, gum-water, &c. ...	1 seer.

Any of these or similar prescriptions can be given every four or six hours. A decoction of bael fruit or indurjub can be also occasionally administered.

In this stage the body should be washed with warm vinegar (sirca) and water (one chittack to one seer).

(f). If the throat swells it should be blistered externally with a hot iron, liquor ammoniæ.

Or croton seeds (joipal er beesh) ...	½ chittack.
Oil of turpentine (tarpen tel) ...	4 chittacks.

let stand for a fortnight, pour off the clear fluid, and rub to the skin after mixing with an equal quantity of cocoanut oil.

Or croton oil (joipal er tel) ...	½ chittack.
Oil of turpentine (tarpen tel) ...	4 chittacks.

this may be used at once.

(g). If there is pain in the chest or cough the blister should be applied to the chest.

(h). If the stomach swells, or there is evident pain in it, the blister should be applied, then linseed oil and turpentine according to the prescription given should be slowly administered by mouth and assafœtida (hing), capsicum (lonka mirch), carraway (jeera), with opium (afeem) or bhang administered after the bowels are moved.

(i). During the whole of the course of the disease the strength of the animal should be sustained by means of frequent drenches of rice and water, boossie and water, suttoo and water, arrowroot and water, or similar food. The thirst of the animal impels it to take too much drink in the second stage; this should be prevented. If ale or beer can be procured, a bottle may be given twice a day.

It is in managing the diet and sustaining the strength of the animal that the secret of successful treatment consists.

One of the first signs of recovery is a return of appetite, and soft, well washed grass should be given in small quantities when any indication of this appears. Care should be taken to keep the animal warm if the hair falls off, and to prevent its eating too much food during recovery.

C. Having gone so minutely into the treatment of Gootee little remains to be said of Puschima. The same means of treatment should be employed.

The more severe character of the disease and the greater tendency to sink should be borne in mind, and nourishing drinks should be steadily given and stimulants, ammonia, ether, capsicum, beer, &c., with camphor or opium, frequently administered. In this as in the former disease all drinks and drenches should be liberally *salted* with common salt (lobun), or saltpetre (shora), or black salt (karee lobun).

In Appendix A. will be found to contain a short description of the most common diseases of cattle, their nature, symptoms, and treatment.

Appendix B. contains a list of the most common cow medicines, their action, use, and dose.

Appendix C. gives a list of useful prescriptions under different headings; and

Appendix D. shows a comparison of English medicine weights with Bengalee weights and measures.

APPENDIX A.

Tabular description of the principal Diseases of Cattle not treated of in the preceding paper.

Name of Disease. English.	Name of Disease. Bengalee.	Nature.	Symptoms.	Treatment.
		I.—Diseases affecting the organs of Respiration.		
1 Catarrh ...	Surdi ...	Inflammation of the lining membrane of the nose.	Shivering; discharge from nostrils, cough, fever, constipation.	Soft or liquid food, slight purge, and small doses of nitre.
2 Bronchitis ...	Utkas ...	Inflammation of the wind-pipe and its branches.	Quick breathing, fever, wheeze or grunt; discharge of clear or mattery fluid from nose, cough, loss of appetite.	Avoidance of cold. Blisters to wind-pipe, slight purge, expectorants.
3 Phthisis ...	Jokkakas or Kaykas	Formation of tubercles in the lungs.	Cough, difficult breathing, wasting, sometimes diarrhœa.	Tonics, generous diet, blisters to chest.
4 Hoose ...	Kirmi upo nulli er bethur.	The existence of parasites in the air tubes.	Severe cough, as if the animal was trying to get something up; rapid wasting; loss of appetite and difficult breathing.	Linseed oil and turpentine. The vapor of chlorine gas or tobacco. Tonics.
5 Pneumonia ...	Phush Phush Pirdaho.	Inflammation of the lung...	Shivering, quick breathing, fever, cough, pain in the side, cow lies down, groaning or grunting, thirst and loss of appetite.	Nutritive liquid food. Blisters to chest. Saline and diuretic medicine.
6 Pleuro Pneumonia.	Same name ...	Inflammation of the lungs and the membrane covering them.	Severe cough, difficult and rapid breathing; fever, pain in the chest; loss of appetite and thirst; failing in milk, grunting or groaning; constipation; swelling of stomach, rapid prostration; diarrhœa at the last.	Blisters to chests. Slight purge, diuretics. Tonics. Nutritive liquid food.

Name of Disease. English.	Name of Disease. Bengalee.	Nature.	Symptoms.	Treatment.
		II.—Diseases of the organs of Digestion.		
1 Choking ...	*Bendejae* ...	*Stoppage and stuffing of food in its passage down the throat.*	*Coughing, thrusting forward the head, discharge of spittle from mouth, difficulty of breathing and moaning.*	*Extraction of the morsel, if possible, by the hand. Pushing it on by a bit of cane with a ball at the end, or cutting it out.*
2 Tympanitis ...	Pet Phappa ...	Distention of the stomach with wind.	Swelling of stomach; hollow sound when struck; intense pain, restlessness, striking stomach with foot, difficulty of breathing.	Oil, mustard, ammonia, linseed oil and castor oil, carminatives, ginger, carraway, &c. Puncturing stomach or passing a tube down the throat.
3 Grainsick ...	Pet bhara ...	Over-distention of the stomach with food.	Swelling of stomach, which is soft; want of appetite, dulness, absence of rumination, constipation; slight difficulty of breathing.	Purge with stimulant followed by linseed oil, rubbing stomach.
4 Inflammation of rumen.	Peter Pirdaho ...	Inflammation of the first stomach consequent on the former disease.	Pain of the side increased by pressure, quick breathing, fever.	Cutting into the stomach on the left side, and removing its contents by hand.
5 Vomitting ...	Vomi ...	Discharge of the contents of the stomach by mouth.	Instead of chewing the cud and swallowing it again the animal ejects it entirely.	Oily purges and soft food.
6 Fardelbound ...	None ...	Packing of hard dry food in the third stomach.	Loss of appetite, absence of rumination, quick breathing, grunting, constipation, dung, dry or glazed or diarrhœa; if not relieved inflammation and fever.	Purge of salts, aloes, and ginger or linseed oil, and turpentine repeated at intervals. Blister externally, soft food. Calomel and opium if inflammation occur.
7 Gastroenteritis "White scour."	Ontor er Pirdaho...	Inflammation of the stomach and intestines in young calves.	At first there is constipation, then a frequent discharge of white fluid stools.	A mild purge followed by an antacid and carminative, and an astringent if it becomes chronic.
8 Diarrhœa ...	Grini, Am er beram	Disease of the membrane of the intestines.	Excessive and frequent discharge of liquid stools, loss of milk, absence of rumination.	A slight purge accompanied by a stimulant followed by astringents.

Name of Disease. English.	Name of Disease. Bengalee.	Nature.	Symptoms.	Treatment.
II.—Diseases of the organs of Digestion,—Continued.				
9 *Chronic Diarrhœa*	Grini, Am er beram	Dependent upon disease of the glands of the intestines.	Frequent loose stools and gradual emaciation.	Stimulants and astringents, tonics, soft nutritious food.
10 *Dysentery* ...	Roctamashoi ...	Ulceration of the membrane of the large intestine.	Frequent discharge of fluid stools mixed with blood, pain, straining, and prostration.	Mild oily purge with an anodyne followed by tonic astringents.
11 *Colic* ...	Shul ...	Spasms of the intestines...	Cow gets up and lies down, strikes belly with legs, severe pain going and coming.	Purge with ammoina and opium.
12 Intussusception..	None ...	Pushing of one portion of an intestine into another.	Continuous pain in stomach, great prostration, kicking of belly, switching of tail, constant discharge of small bits of dung.	Opium and assafœtida. An operation in some cases.
13 Enteritis ...	Ontor er Pirdaho...	Inflammation of the small intestine.	Continuous pain in belly, quick breathing, trembling of the body.	Opium or bhang, linseed oil and gruel, liquid food.
14. Dropsy ...	Joluduri ...	Accumulation of water in the sac of the belly.	Gradual enlargement of the belly, no pain, sound of water when struck.	Tapping on right side, low down, diuretics and tonics.
15 Thrush ...	Gal er gha ...	Ulcers of the mouth ...	Slight fever, discharge from mouth, eruption or ulcers on the inside of the mouth.	Slight purge, application of alum or borax to mouth.
16 Glossitis "Blain."	*Rossin er Pirdaho...*	*Inflammation of the tongue*	*Swelling and protrusion of tongue; difficulty of swallowing; fever, hardening, abscess or mortification may ensue.*	*Scarifying the tongue with a lancet. Gentle saline purge, application of astringents locally.*
III.—Diseases of the organs of Generation.				
1 Abortion ...	Gorbopat ...	Premature birth of calf...	The contents of the womb are expelled before the proper time.	Avoid overworking or over driving cattle with calf. Attention to diet.
2 Retention of the Placenta.	Phul bahar hoisena	The after-birth is not discharged with the calf.	If the placenta becomes decomposed, fever sets in.	Stimulant purgative, ergot of rye. Nitre if fever comes on.
3 Eversion of the bladder.	None ...	The bladder is turned inside out and protrudes.	A red tumor appears in the vagina, and urine constantly dribbles away.	The bladder should be pushed back by hand early.
4 Eversion of the vagina.	....	The vagina is turned inside out and protrudes.	An internal tumour of the private parts generally occurs before parturition.	Replace by hand. Apply cold and astringents and feed well.
5 Eversion of the uterus.	Gorbashoi ulti jawa	The womb is turned inside out and protrudes.	A larger tumour than in the last case protruding from the private parts.	Wash with warm water, re-place and retain the organ by a truss in its place.
6 Dropsy of the uterus.	Gorbashoi er joluduri.	An accumulation of fluid in the womb.	Enlargement similar to pregnancy, but the cow goes beyond her time.	Evacuate the fluid through the vagina by dilating the mouth of the womb with the finger.
7 Puerperal apoplexy.	Shongnar ...	Congestion of the brain ...	The cow becomes restless after calving, falls and rises again, becomes weaker, and finally, lies down and becomes senseless.	Bleeding in the early stage. A smart purge, alcoholic stimulants, blisters to spine.

Name of Disease. English.	Name of Disease. Bengalee.	Nature.	Symptoms.	Treatment.
		III.—Diseases of the Organs of Generation,—Continued.		
8 *Mammitis* ...	Ston er Pirdaho ...	Inflammation of the udder	Heat of the udder, hardness and redness, difficulty in walking, fever, milk changed in quality, abscess or gangrene may ensue.	Bleeding. Fomentations. Nitre and antimony; Iodine ointment if the hardness becomes chronic.
9 *Obstruction of the teats.*	Dudh hund hoi ...	Milk stones, stricture of the milk passages or warts.	The flow of milk is impeded ...	Removal of stones, dilatation of stricture, incision of warts.
10 *Gonorrhœa* ...	Dhat er beram ...	Inflammation of the tube of the penis or of the vagina.	Pain in making water, discharge of matter from penis or vagina, ulcers or mortification may ensue.	Gentle purge. Resin and nitre. Injection of sulphates of zinc or copper, nitrate of silver, &c., Copaiba and carbonate of potash. Cubebs. Solid nitrate of silver to ulcer.
		IV.—Diseases of the Circulatory system.		
1 Disease of the heart.	Ontokurn er beram	Inflammation of the heart or its covering. Foreign bodies in the cavity. Widening or narrowing of the valves, &c.	Quick breathing and rapid or intermittent pulse, pain over heart, want of appetite, debility, failure of milk, wasting, Œdema, fulness of veins.	Purgatives occasionally repeated; bleeding if obstruction; digitalis and belladonna with nitre.
2 Inflammatory fever, "Black Leg."	Bikar, Sonnipat ...	Fever with swelling of one of the legs affecting young animals.	Dulness, lameness (sudden), puffy, swelling of the leg which crackles, rapid sinking.	Bleeding in the earliest stage; strong purge, diuretics and tonics, incisions, attention to diet.
3 *"Rinderpest"* ...	*Puschima* ...	*A febrile disease of an infectious nature affecting large numbers of cattle.*	*The symptoms are the same as those of "Puschima," which we see.*	*Early separation of affected from healthy, and removal of healthy from the locality. Medical treatment the same as for Puschima.*
		V.—Diseases of the Abdominal Viscera.		
1 Jaundice ...	Naba ...	Obstruction to the flow of bile by gall stones or disease of the liver.	Skin and membranes of the eye and mouth yellow, want of energy, constipation. Dung whitish in color, urine deep brown. Pain and fever in some cases.	Purge of aloes and salt. Gentian and nitre. Blisters if the liver is inflamed.
2 Cystitis ...	Muttashoi er Pirdaho.	Inflammation of the bladder.	Pains in the stomach near the back part, fever.	Draw off water. Throw a bland injection into the bladder. Administer a purge and give calomel and opium.
3 Nephritis ...	Mutrogrinte er Pirdaho.	Inflammation of the kidney.	Fever, pain in the loins, increased on pressure, arched back, difficulty and pain in walking and constant attempts to make water without much effect, urine becomes thick and latterly bloody.	Bleeding. Purging. Calomel and opium. Blister to loins. Soft or liquid food.
4 Hœmaturia or red water.	Roctodhat ...	A discharge of blood from the bladder.	Blood comes away with the urine ...	Cold applications, Epsom salts, sulphuric acid. Acetate of lead, soft food.
5 Calculus in the bladder.	Mutrashoi Pattori...	A stony substance in the bladder.	Pain and irritation in making water, sometimes sudden stoppage, occasionally discharge of blood.	Excision is difficult and dangerous, and the animal should be killed for food if circumstances accord.
6 Red water ...	Lallpeshab ...	The urine is colored with the coloring matter of the blood. Attacks numbers of cattle.	Diarrhœa for two or three days followed by constipation; urine first brown, then red, then black. Quick pulse, want of appetite, loss of milk, which becomes brown, emaciation.	Slight purge. Turpentine and nitric ether. Iron and Gentian.

Name of Disease. English.	Name of Disease. Bengalee.	Nature.	Symptoms.	Treatment.
		*V.—Diseases of the Abdominal Viscera,—*Continued.		
7 Splenic apoplexy	Pilei ...	Enlargement of the spleen with blood.	Arched back, difficult of walking, staggering, twitching of muscles, paralysis. Salivation, difficult breathing, quick pulse. Pain, griping, diarrhœa, and blood colored motions, bloody urine, convulsions, fatal in twenty-four hours. 99 per cent. of cases die.	Bleeding, followed by tonics and stimulants. Attention to diet.
		VI.—Diseases of the Brain and Spinal Cord.		
1 Coma ...	Moorcha ...	A state of stupor caused by a variety of structural and functional diseases of the brain.	Dulness gradually increasing, staggering or falling, finally, complete unconsciousness.	Stimulants and purgatives in cases depending on functional causes and poisons.
2 Paralysis ...	Pukkoaghat ...	Impairment of power of motion caused by disease of the brain or spinal cord.	According to the seat of disease the animal loses the power of all its limbs, the limbs of one side or the hind limbs.	If depending on a functional cause strong purgatives and stimulants, followed by nux vomica. Blisters to spine.
3 Phrenitis ...	Mustishkho or Pirdaho Pirlap.	Inflammation of the brain.	Stupor followed by delirium of a furious character, wild appearance, sometimes paralysis.	Bleeding. Purge of Epsom salts and croton oil, tincture of aconite, means to prevent injury.
4 Tetanus ...	Tonkar ...	A spasmodic nervous affection.	Stiffness of gait, stretching of neck, locked jaws, anxious look, spasms increase in violence and come in paroxysms, bowels constipated.	Quiet. Strong purge, sedatives. Liniments to spine.

Name of Disease. English.	Name of Disease. Bengalee.	Nature.	Symptoms.	Treatment.
5 Apoplexy ...	*Shongnar ...*	*Sudden unconsciousness from congestion of the brain or effusion of blood into it.*	*Sudden falling, insensibility, and difficult breathing.*	*Bleeding from jugular; purge tincture of aconite.*
6 Hydrocephalus...	*Sir er jol ...*	*Water between the covering membranes of the brain in young animals.*	*Enlargement of the head. Gradual wasting and stupor.*	*Treatment of no avail.*
7 Ophthalmia ...	Chouk Utta ...	Inflammation of the eye-ball.	Redness, watering, and swelling of the eye, pain, and difficulty of vision.	Remove dust, &c., if present. Give a slight purge and apply fomentations and astringent washes.
		VII.—Diseases of the Skin.		
1 Hide bound ...	Sukka Chamra ...	Absence of the fatty secretion of the glands of the skin.	The skin has a dry harsh feel, there is generally some constitutional disease.	Removal of the constitutional disease slight purgative tonics.
2 Mange ...	......	An eruption caused by a small insect, burrowing into the skin.	Itching, loss of hair in spots, scabs or pimples, wrinkling or folding of the hide.	Sulphur ointment, tar and turpentine ointment, lotion of bichloride of mercury.
3 Lice ...	Kirmi ...	Parasites among the hair.	Swarms of the animals are found on the cow, which is thin and poor.	Stavesack and white Hellebore lotion, strong tobacco decoction.
4 Warbles ...	......	Tumor of the skin containing the eggs of a fly.	A small abscess forms and the young flies escape,	The disease is of no consequence.
5 Ringworm ...	Daad ...	An eruption caused by a vegetable growth, situated generally on the head and neck.	Round patches, scabby, and when peeled raw, discharging a yellow matter, loss of hair, rings form and grow larger, animal in bad condition.	Attention to diet, generous food, sulphur and antimony, iodine or nitrate of silver externally.
6 Warts ...	Asseel ...	Growths of and on the skin.	A round ragged horny growth.	Excision or caustic.

Name of Disease. English.	Name of Disease. Bengalee.	Nature.	Symptoms.	Treatment.
		***VII—Diseases of the Skin,*—Continued.**		
7 Cow-pox ...	Goru Boshunto ...	An eruptive fever, human small-pox in cattle.	Red patches on the udder followed by small bags, which contain a clear and then a yellow fluid; these become crusts; little or no fever.	Mild purging, warmth, and careful dieting.
		VIII.—External Injuries, &c.		
1 Wound ...	Jukm, Aghath ...	Divisions of soft parts, simple, lacerated, contused or punctured.	Bleeding slight or severe according to the severity of the injury.	Bleeding to be stopped by pressure, cold or ligature; wound to be stitched; cold water dressings, warm fomentations to lacerated or contused wounds.
2 Fractures ...	Ostibhango ...	Breaking of bones with or without external wound.	Shortening of limbs, deformity. Crackling sound from rubbing of the ends of the broken bones.	Cold applications, leather splints if the site of fracture admit.
3 Inflamed vein ...	Shira Pirdaho ...	Inflammation of a vein in consequence of bleeding.	Swelling, redness, and discharge from a wounded vein.	Fomentations, withdrawal of pin.
4 Opened joint ...	Grinti er jukm ...	Penetrating wound of a joint.	Discharge of fluid from the wound of a joint.	Hot iron to be applied to orifice followed by alum.
5 Foul in the foot	*Paw er gha* ...	*Ulceration of the cleft of the hoof from the presence of foreign bodies.*	*Lameness, unhealthy dischar[illegible] from the part, fever, swelling of fo[illegible]*	*Remove foreign bodies, clean thoroughly, apply astringent washes, caustics if necessary.*
6 Sprain ...	*Moska* ...	*Rupture of a tendon from violence.*	*Lameness, pain, heat and swe[illegible]g of part.*	*Rest, cold application, stimulant, liniments when inflammation subsides.*
7 Rheumatism ...	Bat ...	A constitutional disease with local swellings.	Fever, lameness, pain and swelling of one joint and then another.	Purge, nitre. Aconite, if pain severe.
8 Hernia ...	Onterbiddi ...	Protrusion of the intestines through a weak part of the abdominal walls.	An external swelling of the belly capable of being re-placed into the cavity of the abdomen.	In some cases this condition can be remedied by operation.

APPENDIX B.

List of Medicines used in the treatment of diseases of Cattle, their actions, use and doses. Medicines procurable in Bazaars distinguished by an asterisk.

Names of Drugs.		Action.	Use.	Dose.	Reference to Prescriptions.
English.	Bengalee.				
* Acacia ...	Bablaratta ...	Nutritious and soothing (IX.)...	To soothe inflamed and irritated membranes.	To any amount ...	49, 80.
* Acetum ...	Sirca ...	Astringent internally (V.) Stimulant externally (XV.)	To wash sore or foul surfaces ...	1 chittack to 1 seer of warm water.	70.
* Aconite ...	Katbeesh, Meeta beesh	Sedative and anodyne (II.) ...	In fevers and inflammations ...	10 to 20 phuttas of the tincture, (orisht).	9, 10, 59, 61.
* Adeps ...	Churbi ...	(XVI.) ...	To make ointments ...	Not used alone ...	71.
Ether Sulphuric ...	... ...	Stimulant (XVII.) ...	In diseases of debility ...	½ to 1 chittack ...	74.
Ether Nitric ...	... ...	Stimulant and diuretic (XI.) ...	In all febrile complaints ...	Ditto ...	6, 18, 51, 53, 56, 59, 75.
* Alcohol ...	Sharab ...	Stimulant (XVII.) ...	In debility and prostration ...	According to quality used ...	7, 67, 57, 68, 85.
* Aloes ...	Mosubber ...	Aperient (IV.), alterative (I.) ...	To open bowels, to improve condition.	1 to 3 tolahs ...	3, 16, 23, 24, 67.
* Alum ...	Phitkarie ...	Astringent (V.), (XV.) ...	To check discharges and improve ulcers.	½ to 1 chittack.	
* Aromatic spirit of ammonia ...	... ...	Stimulant (XVII.) ...	In debility and prostration ...	Ditto ...	16, 20, 40, 75.
Water of ammonia ...	... ...	Ditto ...	Ditto ditto ...	Ditto ...	34, 36, 57.
Carbonate of ammonia	... ...	Ditto ...	Ditto ditto ...	1½ to 2½ tolahs ...	41, 83.
* Black antimony ...	Soorma ...	Febrifuge (XIV.), alterative (I.)	In all fevers ...	½ to 1 tolah ...	1, 52.
Tartar Emetic ...	... ...	Febrifuge (XIV.), emetic (XII.)	Ditto ...	¼ to ½ tolah ...	37, 62.
* Arsenic ...	Shemel khar, Shenko-beesh.	Caustic (VIII.) ...	To remove warts, &c. ...	Not used internally ...	46.
* Assafœtida ...	Hing ...	Stimulant and carminative (VI.)	In flatulent swelling ...	½ to 1 tolah ...	13, 14.
* Barley ...	Jaub ...	Demulcent (IX.) ...	As a vehicle for medicines and soothing drink.	To any amount.	
* Bael ...	Bêl ...	Astringent (V.) ...	To check excessive discharges	1 to 2 chittacks.	
Belladonna ...	... ...	Anodyne (II.) ...	In spasmodic diseases ...	½ to 1 tolah of the extract	10, 11.
* Borax ...	Sohaga ...	Astringent (V.) ...	To inflamed or ulcerated surfaces.	½ to 1 tolah.	
Calomel ...	Para ...	Aperient (IV.) ...	To open the bowels ...	¼ tolah ...	17.
Mercury and chalk ...	Para, karee muttee ...	Aperient (IV.), alterative (I.) ...	Ditto ditto ...	¼ to 1 tolah ...	2.
* Camphor ...	Kafoor ...	Febrifuge (XIV.) ...	In low stages of fevers. ...	1 to 1½ chittacks ...	5, 63, 74.
* Cannabis ...	Gunja, Churus, Bhang	Anodyne (II.) ...	In painful and irritating diseases	¼ to 1 chittack	13.
Cantharis ...	... ...	*Blister (VI.)* ...	*As a counter-irritant* ...	*Not given internally* ...	*38.*
* *Capsicum* ...	*Lonka mirch* ...	*Stimulant (XVII.), carminative (VII).*	*In low fevers and colic flatulent distension.*	*¼ to ¾ tolah* ...	*14.*
* *Carbon* ...	*Koela aungar* ...	*Corrects putrefaction* ...	*As a poultice to mortifications*	*Not given internally.*	
* *Carraway* ...	*Jeera* ...	*Stimulant, carminative (VII.)* ...	*In flatulent distension* ...	*1 to 1½ chittack* ...	*13, 32, 42, 82.*
* *Catechu* ...	*Khoyre* ...	*Astringent (V.)* ...	*To check discharges* ...	*¼ to 1 tolah* ...	*30, 32, 33.*
* *Chalk* ...	*Karee muttee* ...	*Ditto* ...	*Ditto ditto* ...	*½ to 1½ tolah* ...	*27, 28, 29, 32, 33.*
* *Cheretta* ...	*Cheretta* ...	*Tonic (XIX.)* ...	*In debility and emaciation* ...	*Ditto* ...	*27, 28, 29, 42, 82.*
* *Sulphate of copper* ...	*Tooteea* ...	*Astringent (V.)* ...	*To check discharges, to improve the state of wounds.*	*½ to 1 tolah* ...	*65, 72, 77, 83.*
* Acetate of copper ...	Zungul Zungar ...	Caustic (VII.) ...	An application to foul wounds	Not used internally ...	73.
* Croton ...	Joipal ...	Aperient (IV.) ...	To open the bowels externally, to produce suppuration.	10 to 20 ruttees ...	24, 25, 55.
* Cubebs ...	Kabab cheenee ...	Tonic (XIX.) ...	In gonorrhœa ...	1 to 1½ chittack.	
Balsam of Copaiba ...	... ...	Demulcent (IX.) ...	Ditto ...	½ to 1 chittack.	
Digitalis ...	... ...	Febrifuge (XIV.), sedative and diuretic (XI.) ...	In fevers and diseases of the heart.	⅛ to ¼ tolah ...	62.
Ergot ...	... ...	Stimulant (XVII.) ...	In delayed parturition ...	¼ to ½ chittack ...	86.
* Galls ...	Majuphul ...	Astringent (V.) ...	To check discharges ...	1 to 3 tolahs.	
Gentian ...	... ...	Tonic (XIX.) ...	In debility and emaciation ...	½ to 1½ tolah ...	29, 33, 27, 28, 29, 41, 42.
* Ginger ...	Adda (wet) soot (dry) ...	Carminative (VII.), stimulant (XVII.) ...	In flatulent distension and colic.	1 to 3 chittacks ...	3, 15, 16, 21, 24, 28, 32, 41, 42, 82.
Hellebore, black ...	... ...	Irritant ...	To produce blistering or inflammation externally.	Not used internally ...	71.
* Indigo ...	Nil ...	Soothing ...	To wounds of the skin ...	Ditto.	
Iodine ...	... ...	Stimulant, produces absorption	To swellings and hardenings, to produce absorption	Ditto ...	68.
* Sulphate of iron ...	Hirekos ...	Astringent (V.), tonic (XIX.)...	In states of debility and bad health.	½ to 2 tolahs ...	81.
* Acetate of lead ...	Sheesh sharkera ...	Astringent (XV.)	To check discharges and improve sores.	Not used internally ...	64, 80.
* Lime-water ...	Chuner jol ...	Astringent (V.), and tonic (XIX.)	In diarrhœa ...	1 to 10 chittacks ...	4, 31.
Liq. ammonia acetatis	... ...	Diaphoretic (X.) ...	In fevers ...	1 to 4 chittacks ...	51, 53.
Linseed ...	Moshneer beech ...	Demulcent (IX.) ...	For drinks and poultices ...	To any amount.	
* Sulphate of Magnesia	Salts ...	Aperient (IV.) ...	To open the bowels ...	½ to 1 seer ...	15, 16, 20, 21.
* Myrrh ...	Gondobol ...	Astringent ...	Applied to sores	Not given internally ...	67.
Muriatic acid ...	Lobun er drapoc ...	Tonic (XIX.), and astringent	With nitric acid in liver disease.	5 to 10 phuttas in water ...	84.
* Mustard ...	Rai ...	Stimulant (XVII) ...	In flatulent distension of stomach.	½ seer ...	36, 39.
Nitric acid ...	Sora er drapoc ...	Caustic ...	To growths and foul ulcers ...	Not used internally ...	45, 76, 84.
* Nux Vomica ...	Kuchla ...	Stimulant (XVII.) ...	In paralysis ...	½ kutcha of the tincture ...	85.
* Nitrate of potash ...	Shora ...	Febrifuge (XIV.), diuretic (XI.)	In fevers and dropsies ...	1 to 4 tolahs ...	10, 21, 51, 52, 54, 55, 60, 62, 63.
* Croton oil ...	Joipal er tel ...	Aperient (IV.) ...	To move bowels ...	20 to 30 phuttas in linseed oil.	
* Cocoanut oil ...	Narkul er tel ...	Demulcent (IX.) ...	With wax for an ointment ...	Not given internally ...	34, 37, 57, 73.
* Castor oil ...	Rendi er tel ...	Purgative (IV.) ...	To move bowels ...	1 to 5 chittacks.	
* Linseed oil ...	Moshiner tel ...	Aperient (IV.) ...	Ditto ...	¼ to 1 seer ...	18, 19, 25, 26, 58, 79.
* Oil of turpentine ...	Tarpen tel ...	Stimulant (XVII.) ...	In low fevers ...	½ to 1½ chittack ...	26, 34, 35, 36, 38, 56, 57, 58, 78, 79.

APPENDIX B.—*Continued.*

Names of Drugs. English.	Names of Drugs. Bengalee.	Action.	Use.	Dose.	Reference to Prescriptions.
* *Opium* ...	Afeem ...	Anodyne (II.) ...	In diarrhœa and dysentery, &c.	¼ to 1 tolah ...	5, 6, 7, 9, 11, 14, 17, 18, 19, 20, 27, 28, 30, 32, 59.
* Pepper ...	Golmirch ...	Stimulant (XVII.) ...	In low fevers ...	⅙ to 1 tolah ...	22.
* Prussic acid ...	... ...	Anodyne (II.) ...	In tetanus ...	¼ to ½ kutcha ...	12.
* Resin ...	Dhuna ...	Diuretic (XI.) ...	In dropsies ...	½ to 2 chittacks ...	55.
* Rhubarb ...	Rheucheenee ...	Alterative (I.), and tonic (XIX.)	In disorders of stomach ...	1 to 4 tolahs ...	2.
* Salt ...	Lobun ...	Purgative (IV.) ...	In all diseases ...	½ to 1 seer ...	22.
* Black or Bay salt ...	Karee lobun ...	Febrifuge (XIV.) ...	In fevers ...	⅛ to 1 chittack ...	52.
* Soap ...	Sabun ...	Demulcent (IX.) ...	To make liniments ...	Not given internally.	
Sulphate of Soda ...	... ...	Purgative (IV.) ..	To move bowels ...	½ to 1 seer.	
Nitrate of silver ...	Kastic ...	Caustic (VIII.) ...	To burn and destroy growths, &c.	Not given internally ...	43, 44, 66.
* Starch ...	Már ...	Demulcent (IX.) ...	To soothe inflamed membranes	To any amount.	
* Sulphur ...	Gundruck ...	Purgative (IV.) ...	To open bowels ...	2 to 4 chittacks ...	1, 21, 22.
Sulphuric acid ...	Gundruck er drapoe ...	Stimulant and tonic (XIX.)	To swollen limbs, &c. ...	Not given internally ...	45, 58.
Turpentine (Venice)...	Gundabroja ...	Stimulant (XVII.) ...	To foul sores ...	Ditto ...	71, 73.
* Treacle ...	Dhar ...	Demulcent (IX.) ...	To soothe inflamed surfaces ...	To any amount ...	72.
Sulphate of Zinc ...	Dosta ...	Astringent (XV.) ...	To foul sores ...	Not used internally ...	64, 69.
Wax ...	Mom ...	Demulcent (IX.) ...	To make ointment ...	Not given internally ...	37, 73.

APPENDIX C.

PRESCRIPTIONS FOR CATTLE DISEASES.—Arranged according to the action of the principal ingredient.

The following prescriptions are intended for full grown animals. When administered to younger beasts the dose will be diminished according to age. Strong and well nourished cattle will stand larger doses than weak and thin animals.

Medicines should generally be administered to cattle in a liquid form: a horn with the sharp end cut, a black bottle or a bamboo, such as is used for holding oil, will be found the best means of administering them. The mouth is held pretty wide open, and the medicine carefully and gradually poured in. If the animal begins to cough the operation should be desisted from till it breathes easily again.

Prescriptions which can be obtained in the bazaars are marked by an asterisk.

A few only are given under each Class.

I.—Medicines which improve the condition of a cow and causes it to fatten better on food (alteratives)—

1. Sulphur (gundruck) ... ... ½ chittack.
   *Black antimony (soorma) ... ... 1 tolah.

To make a powder, which is to be given daily in rice-water till some improvement appears.

In diseases in which gradual emaciation and derangement of bowels or digestion is prominent.

2. Mercury and chalk ... ... ⅛ tolah.
   Powdered rhubarb (rheu er cheenee) ... ¼ ,,

To make a powder, which is to be given twice a day in one seer of rice-water.

Given in similar cases.

3. *Aloes (mosubber) ... ... ½ chittack.
   Soda (sujee muttee) ... ... ½ ,,
   Dry ginger (soot) ... ... 1 ,,
   Boiling water ... ... ½ seer.

Give four chittacks in one seer of suttoo and water or rice-water on two successive days.

When a cow is off its feed with slight constipation, dry skin, and in bad condition.

4. *Lime (chunna) ... ... 1 chittack.
   Water ... ... 1 seer.

Allow this to stand for twenty-four hours. One chittack to be given in rice-water or whey every morning.

In wasting with occasional looseness of bowels.

Good *in chronic diarrhœa* of calves.

II.—Medicines which relieve pain (anodyne)—

5. *Powdered opium (afeem) ... ... ⅓ tolah.
   Camphor (kafoor) ... ... 1 chittack.

To be given in one seer of water or beer.

In any disease accompanied with pain.

Ethereal Tincture.

6. Opium (afeem) ... ... 1 chittack.
   Spirit of nitric ether ... ... 8 chittacks.

Filter after fourteen days maceration. Dose half to one and a half chittack.

Tincture of Opium (afeem er orisht).

7. Opium (afeem) ... ... 1 chittack.
   Spirit ... ... 8 chittacks.

Filter after four days' maceration. Dose half to one and a half chittack. In water, beer, rice-water, &c.

8. *Indian hemp (bhang) ... ... $\frac{1}{2}$ chittack.
Opium (afeem) ... ... $\frac{1}{2}$ tolah.
Ginger (soot) ... ... 1 chittack.

To be given in one seer of water, beer, &c. In colic and painful intestinal disorders—

9. Tincture of Opium ... ... $\frac{1}{2}$ chittack.
(No. 6 or 7).

Tincture of Aconite 10 to 15 phuttas in linseed gruel (moshin er boossee) every two hours for dysentery.

10. Extract of belladonna ... ... $\frac{1}{2}$ tolah.
Tincture of aconite ... ... 10 phuttas.
Nitre (shora) ... ... $1\frac{1}{4}$ tolah.

To be given twice or thrice a day in inflammatory diseases of the heart.

III.—Medicines which relieve spasms (antispasmodics)—

11. Extract of belladonna ... ... $\frac{1}{2}$ tolah.
Opium (afeem) ... ... $\frac{1}{4}$,,

Dissolve in one and a half seer of warm water and repeat every four hours in tetanus.

12. Prussic acid (dilute) ... ... $\frac{1}{2}$ tolah.

Repeated every hour in tetanus.

13. *Assafœtida (hing) ... ... 1 tolah.
Bhang ... ... 2 tolahs.
Carraway (jeera) ... ... 1 chittack.

To be given in one seer of warm water frequently in colic.

14. Capsicum (lonka mirch) ... ... $\frac{1}{2}$ tolah.
Opium (afeem) ... ... 15 ruttees.
Assafœtida (hing) ... ... 1 tolah.

In one seer of warm water frequently in colic and tympanitis.

IV.—Medicines which move the bowels (aperients)—

15. Epsom salts ... ... 4 chittacks.
Powdered ginger (soot) ... ... 1 tolah.

In a quart of whey, beer, or rice-water. In slight febrile diseases.

16. Epsom salts ... ... 6 chittacks.
Powdered ginger (soot) ... ... $\frac{1}{2}$ chittack.
Aromatic spirit of ammonia ... ... $\frac{1}{2}$,,
Solution of aloes (mosubber) ... ... 2 chittacks.

In one seer of whey or rice water.

17. Calomel ... ... $\frac{1}{4}$ tolah.
Opium ... ... 15 ruttees.
Linseed oil ... ... $\frac{1}{2}$ seer.

In inflammatory diseases of the stomach to be repeated every four hours if necessary.

18. Linseed oil ... ... $\frac{1}{2}$ seer.
Tincture of opium ... ... $\frac{1}{4}$ chittack.
Sweet spirit of nitre ... ... $\frac{1}{2}$,,

Two cutchas to be given to calves twice or thrice a day in chronic diarrhœa.

19. *Linseed oil (moshin er tel) ... ... $\frac{1}{2}$ seer.
Tincture of opium (afeem er orisht) ... $\frac{1}{2}$ chittack.

A gentle purge for recent diarrhœa.

20. Epsom salts ... ... $\frac{1}{2}$ seer.
Aromatic spirit of ammonia ... ... $\frac{1}{2}$ chittack.
Tincture of opium ... ... 1 ,,

A good purgative in colic.

21. *Epsom salts ... ... 6 chittacks.
Sulphur (gundruck) ... ... 2 ,,
Nitre (shora) ... ... $\frac{1}{2}$ chittack.
Ginger (soot) ... ... $\frac{1}{2}$,,

To be given in one seer of water. A good purge in Gootee or Puschima.

22. *Sulphur (gundruck) ... ... 4 chittacks.
Salt (lobun) ... ... $\frac{1}{2}$ seer.
Pepper (golmirch) ... ... $\frac{1}{2}$ chittack.

To be given in one seer of rice water or linseed boossee and water.

Solution of aloes (mosubber er jol).

23. *Aloes (mosubber) ... ... 1 chittack.
Soda (sujeemuttee) ... ... 1 ,,
Boiling water ... ... 8 chittacks.
Dose ... ... 4 to 6 chittacks.

24. *Croton seeds (joipal er beech) ... ... 5 ruttees.
Solution of aloes (mosubber er jol) ... 2 chittacks.
Ginger (soot) ... ... $\frac{1}{2}$ tolah.

A strong purge in febrile disease.

25. *Linseed oil (moshiner tel) ... ... 1 seer.
Croton oil (joipal er tel) ... ... 10 phuttas.

To be given slowly and repeated if necessary.

26. *Linseed oil (moshiner tel) ... ... 1 seer.
Oil of turpentine (tarpen tel) ... ... 2 chittacks.

To be administered slowly in cases of "Fardelbound."

V.—Medicines which check morbid discharges (astringents)—

27. *Powdered opium (afeem) ... ... 10 ruttees.
Chalk (karee muttee) ... ... $\frac{1}{2}$ chittack.
Powdered cheretta or gentian ... ... 2 tolahs.

To be given in one seer of rice and water, or boossee and water.

28. *Chalk (karee muttee) ... ... 1 chittack.
Chirettta or gentian ... ... $\frac{1}{2}$,,
Ginger (soot) ... ... $\frac{1}{2}$ tolah.
Opium ... ... $\frac{1}{4}$,,

To be given twice a day in mucilage, starch water, &c.

29. *Powdered galls (majuphul) ... ... $1\frac{1}{4}$ tolahs.
Chalk (karee muttee) ... ... $\frac{1}{2}$ chittack.
Cheretta or gentian ... ... $\frac{1}{2}$,,

To be given in diarrhœa once or twice a day.

30. *Catechu (khoyre) ... ... 1 tolah.
Opium (afeem) ... ... $\frac{1}{4}$,,

In rice or linseed gruel two or three times a day.

31. *Lime water (chuner jol) ... ... 4 chittacks.
Milk (dudh) ... ... 1 seer.

In diarrhœa.

To be given three times a day in diarrhœa.

32. *Chalk (kharee muttee) ... ... 1 chittack.
Catechu (khoyre) ... ... $\frac{1}{2}$,,
Ginger (soot) ... ... $1\frac{1}{2}$ tolahs.
Opium (afeem) ... ... $\frac{1}{4}$ tolah.
Carraway (jeera) ... ... $\frac{1}{2}$,,
Water ... ... 1 seer.

Two to four cutchas in diarrhœa or dysentery, morning and night.

33. *Galls (majuphul) ... ... $\frac{1}{4}$ tolah.
Catechu (khoyre) ... ... $\frac{1}{2}$,,
Chalk (karee muttee) ... ... 1 chittack.

In dysentery or diarrhœa twice a day.

VI.—Medicines which inflame and blister the skin (blisters)—

34. Oil of turpentine (tarpen tel) ... ... 1 chittack.
Liquid ammonia ... ... 1 "
Cocoanut oil (narkul er tel) ... ... 1 "
Mix and apply by rubbing.

35. *Croton seeds (joipal er beech) ... ... ½ chittack.
Oil of turpentine (tarpen tel) ... ... 6 chittacks, or 4 chittacks.

If wanted strong allow this to stand for a fortnight and then pour off the clear fluid, which is to be mixed with an equal quantity of cocoanut oil and rubbed to the part.

36. Liquid ammonia ... ... 1 chittack.
Mustard (rai) ... ... 1 "
Oil of turpentine ... ... 1 "
To be rubbed to the skin after the hairs have been removed.

37. Tartar emetic ... ... ½ tolah.
Wax (mom) ... ... ¼ chittack.
Cocoanut oil (narkul er tel) ... ... ¼ "
Mix the wax and oil together and add the tartar emetic.
To be rubbed to the skin.

38. Cantharides ... ... 1 chittack.
Oil of turpentine (tarpen tel) ... ... 8 chittacks.
Mix, an excellent blister.

VII.—Medicines which relieve distension of the bowels with wind (carminatives)—

39. *Mustard powder (rai) ... ... 2 chittacks.
Water (jol) ... ... ½ seer.
Given in distension of the stomach with wind.

40. Aromatic spirit of ammonia ... ... 1 chittack.
Carbonate of ammonia ... ... ½ "
Cold water ... ... ½ seer.
Given in similar cases.

41. Powdered gentian ... ... 1½ tolah.
Ditto ginger (soot) ... ... 1½ "
Linseed meal (mooshiner boossee) ... 1 chittack.
Given twice a day in 1 seer of beer or rice-water.
In chronic flatulent distension.

42. Cheretta or gentian ... ... 1¼ tolahs.
Ginger (soot) ... ... ¼ tolah.
Carraway (jeera) ... ... ½ chittack.
Given twice a day in water or beer.

VIII.—Medicines which burn and destroy the soft textures of the body (caustics)—

43. Nitrate of silver applied in substance.

44. Nitrate of silver ... ... 20 ruttees.
Water ... ... 1 chittack.
Applied to inflamed surfaces.

45. Nitric acid (shora er drapoc) or sulphuric acid (gundruck er drapoc).
Applied with cotton to surfaces which it is wished to destroy.

46. White arsenic, (shenko beesh.)
Applied as a powder alone or mixed with an equal part of flour (soojee) to sloughing ulcers.

47. *Corrosive sublimate (rosh karpoor) ... ½ chittack.
Flour (soojee) ... ... 1 "
Applied to parts which it is wished to destroy.

48. A piece of iron at a red heat acts well in absence of other caustics.

IX.—Medicines which soothe irritated and inflamed parts (demulcents)—

49. Gum (bablar atta) ... ... 4 chittacks.
Water ... ... 1 seer.
A good vehicle for other medicines.

50. Boiled rice, Suttoo, Arrow-root, Linseed meal, Rice boossee, Barley (jawb) ... water 1 seer.
Any of these substances can be prepared for a drink or drench, easily swallowed and soothing to the mucous-membranes, and form admirable means for administering medicines.

X.—Medicines which promote the action of the skin (diaphoretics)—

51. Nitric ether ... ... ½ chittack.
Nitre (shora) ... ... 2 tolahs.
Liquor acetatis ammonia ... ... 2 chittacks.
To be given every four hours in some gruel in fevers and colds.

52. *Black antimony (soorma) ... ... ½ tolah.
Nitre (shora) ... ... 1 "
Black salt (karee lobun) ... ... ½ chittack.
To be given in one seer of some gruel two or three times a day in fevers.

XI.—Medicines which increase the secretion of urine (diuretics)—

53. Sweet spirit of nitre ... ... 1 chittack.
Solution of acetrate of ammonia ... ... 3 chittacks.
To be given in one seer of warm water or beer twice or thrice a day.

54. Nitrate of Potash (shora) ... ... 1¼ tolah.
Water ... ... ½ seer.
To be given once or twice a day.

55. *Powdered resin (dhuna) ... ... 1½ chittacks.
Nitre (shora) ... ... 1½ "
In warm rice or linseed gruel daily.

56. Sweet spirit of nitre ... ... ½ chittack.
Oil of turpentine... ... ... ½ "
To be given once or twice a day in a large quantity of rice or linseed gruel.

XII.—Medicines which are applied externally to painful and swollen parts (embrocations or liniments)—

57. Oil of turpentine (tarpen tel) ... ... ½ chittack.
Cocoanut oil (narkul er tel) ... ... 4 chittacks.
Liquid ammonia ... ... ½ chittack.
Mix and rub to sprains and swellings.

58. Linseed oil (moshiner tel) ... ... ½ seer.
Oil of turpentine (terpen tel) ... ... 2 chittacks.
Mix and add one and a half cutcha of sulphuric acid (gundruck er drapoc).
To be rubbed to swollen parts, useful in chronic rheumatism.

XIII.—Medicines which assist in getting rid of morbid discharges from the lungs.

59. (Expectorants) sweet spirit of nitre ... 2 chittacks.
Powdered opium (afeem) ... ... ½ tolah.
Tincture of aconite (kat beesh er orisht) ... 40 phuttas.
Half chittack of this to be given twice a day in rice-water or mucilage till the cough is relieved.

10. In some cases epizootics are preceded or succeeded by an epizootic invasion of a milder form of disease. Foot and mouth disease is reported to have preceded and succeeded "Gootee" in some instances.(1)

(1) XXIII., 1. XXV. XX. XVIII., 1.

11. Occasionally the spread of the epizootic is observed to have a definite direction. In Assam it spread eastward.(2) In Backergunge it is also said to have proceeded eastward(3)*, while in the case of the Jessore epizootic of 1867, which I investigated personally, it seemed to pursue a northerly course.(4)

(2) XXIX.
(3) XIII., 1.
(4) XXV.

12. In many severe epizootics, the origin and spread of epizootics was observed to coincide with the origin and spread of epidemics of fever and cholera among man. This was notably the case in Assam in 1853.(5) This simultaneous occurrence of epizootics and epidemics is a well known fact, and is stated as one of the laws of epidemic influence by Dr. Aitken.(6).

(5) XXIX.
(6) XXXII., p. 223.

13. Besides cattle, other animals, tame and wild, have been involved in severe epizootics. Lieutenant Gregory says that in Seebsaugor domestic animals alone were not attacked, as deer and other wild animals were found dead in the jungle with the same symptoms.(7) Dr. Coates says "that the disease (Gootee) is contagious among cattle, cows, buffaloes, sheep, goats, and even horses have it."(8) Mr. Stevens adds pigs to the list.(9) It is said to attack horses and other animals in the North-West.(10) Dr. Jackson says that buffaloes, male and female, bulls, cows, bullocks, sheep, and goats are liable to the disease.(11)† I was informed that during the epizootic which prevailed in the south of Jessore in 1866, wild pigs, deer, and buffaloes were found dead in unusually great numbers in the jungle. Dr. Palmer, who does not believe in the communicability to horses, gives a very remarkable instance in which two horses apparently caught the disease by infection, and died of an affection very similar to the Calcutta epizootic.(12)‡

(7) II.
(8) VII.
(9) XV., 1. Also XXIII., 5.
(10) X.
(11) XI., 2.
(12) X., p. 4.

14. While there is a strong probability of epizootics spreading by other agencies than infection, there are many remarkable instances on record of its importation by diseased animals. This will be more particularly discussed in the next section.

* In Satkeerah, 24-Pergunnahs, it is also described as travelling eastward. (XX.)

† Major Lamb, Deputy Commissioner of Durrung, remarks that large numbers of cows, swine, fowls, ducks, and pigeons have been carried off this year (1867). (XXXV., 1.)

‡ Dr. McPherson (XXXI, p. 14) alludes to a disease among fowls, which has sometimes prevailed simultaneously with small-pox in Lower Bengal, but often quite independently of it. This disease is still very common in the district of Jessore; it affects hens and turkeys, and prevails most in the hot weather. I have no facts showing its relation to other epizootics. It is called Gootee, &c., by the natives.

15. *A locality in which an epizootic has recently prevailed does not suffer so severely when visited a second time.* (1)

(1) II.

These laws of the mode of origin and spread of epizootics apply equally to epidemics of disease among men. This will appear from a perusal of the excellent remarks of Dr. Aitken on the laws of endemic and epidemic influence, and the facts stated in the preceding paragraphs are familiar to the student of human medicine.

Accurate information upon the place and mode of origin of epizootics, the manner, direction, and rate of spread, and generally on all the points summarized in the foregoing, is much wanted, and the exact relations of epizootics and epidemics have still to be worked out.

I shall here transcribe, for the purpose of reference and comparison, Dr. Aitken's principal conclusion.

Specific Disease Poisons.—The matter by which the specific miasmatic diseases are communicated and propagated is solely derived from the body of the similarly diseased human or animal being; for there, during the course of the specific disease, is the soil in which the specific poison is bred to multiply and propagate its kind.

Endemic influences result from those conditions or agencies peculiar to a locality which favor the development of various miasmatic diseases.

They become active through the following conditions, namely:—

1st.—The specific poisons are never totally in abeyance.

2nd.—The germs of specific diseases are always extant and develop under favorable conditions becoming epidemic influences.

3rd.—These diseases are characterised by alternations of slumber and activity, prevalence in one place, while neighbouring places are free, and successive invasion of neighbouring places.

4th.—The specific morbid poison, which is a constant element, is capable of transmission from place to place, alternately breaking out and becoming dormant.

5th.—In large towns the fever poisons are always present, in country places they only now and then occur. When disease is developed in the latter places the ratio of persons or animals attacked is greater.

6th.—In country places the dung heaps, &c., are the principal media of diffusion.

7th.—All the specific diseases multiply their kind after similar means of propagation.

8th.—All of them establish a constant series of morbid changes and lesions, and always issue in the production of its own specific germ or miasma.

9th.—Certain receptive conditions or a predisposition exist in individuals which appear essential to the development of the specific poisons and the establishment of the disease, and an immunity against a repetition is generally conferred by one attack.

10th.—Putrescent emanations seem to favor the development and spread of these diseases.

Laws of Epidemic Influences.

1st.—Predispose to disease independently of any other cause.

Give increased energy to other causes, and give rise to new and anomalous forms of disease.

2nd.—Give rise to peculiar types of prevailing diseases.

3rd.—Impress other diseases with their peculiarities.

4th.—Their manifestations are preceded by modifications in the character of prevailing diseases.

5th—First effects most violent.

6th.—Sometimes disappear entirely after a short prevalence; sometimes continue with intermission, two, three, four, or five years.

7th.—Different epidemic diseases are apt to alternate.

8th.—The lower animals are also subject to epidemic influences. XXX. p., 213, 223.

V.—*Causation.*

On this head the information is necessarily somewhat speculative. The subject resolves itself into the two usual divisions of predisposing and exciting causes.

1. Of the *predisposing causes* the most important is *season.* The more severe epizootics of which we have a record have occurred either during the cold weather or towards the close of it. The Assam epizootic of 1853 raged from January to June (1). Lambert writing in June, states that the Ceylon epizootic of 1842 had raged for many months (2). Captain Nelson writing in July, states that the Madras epizootic had lasted three months (3).

(1) II.
(2) XXVIII.
(3) I., 1.

The Darjeeling epizootic broke out in November (4), and again in April, and subsequently in August and September.

(4) XVIII., 1.

The Calcutta epizootic broke in January and continued till April (5).

(5) X.

The Tipperah epizootic seems to have broken out in February (6).

(6) XVI.

The Backergunge epizootic broke out also in February (1). Dr. Jackson, writing from Balasore, says :—"Natives state that December, January, and the early part of February are the worst months during the year. The virulence begins to decrease on or about the latter month (2). Other reports very slightly.

(1) XIII., 1.
(2) XI., 2.

In Hooghly it is said to appear every year in the beginning of the hot season (3).

(3) XVII.

In Bhaugulpore it is said to attack cattle during the winter months (4).

(4) XVIII.

In Behar it is stated to prevail at the conclusion of the hot weather and beginning of the rains (5).

(5) VII., 3.

It prevailed in Bograh in May 1866 (6).

(6) XXIV.

In Nuddea it is stated to occur in April and May (7).

(7) XIX.

Mr. Sawers says that "all admit that the disease is worst in April and May (8). This coincides with the result of my own observations (9). In the Eastern Dooars Gootee is described as recurring every year in May, June and July (10). In Chumparun Gootee is said "to prevail in the rains but may remain a whole year in a herd" (11). Mr. Stevens states that Gootee is prevalent from Cheyt to Assar (April to June), and Khoraha from Assar to Bhadro (June to August) (12). Dukuha in Patna is said generally to break out in July and August (13).

(8) VIII., 2.
(9) XXV.
(10) XIV.
(11) VII.
(12) XV., 1.
(13) XV.

In Maldah Gootee is said to commence in August and extend up to April (14).

(14) VI.

In Noakally cattle disease is said to prevail in September and October (15). In Cuttack foot and mouth disease prevailed in July (16). In the station of Comillah a severe epizootic raged in July and August (17). In Assam cattle disease is said to break out in April and May, and September and October (18).*

(15) III.
(16) XXII.
(17) XVI., 2.
(18) VI.

From the foregoing evidence, it is clear that while the epizootics under consideration may occur in any month of the year, they are less frequent during the rains and more common during the dry months, and adopting Dr. Macpherson's division of the year there is reason to

* In April 1867, an epizootic of cattle disease broke out and lasted till the middle of August, XXXV., 3.

In British Burmah, according to Mr. Gudgin, Veterinary Surgeon, cattle disease (Puschima) is most prevalent during the latter part of the dry and early part of the rainy season, XXXVI., p. 4.

think that the same order of prevalence and severity obtains in regard to epizootics which he has indicated with respect to cholera, (1) namely, that the hot months (March, April, and May) produce most disease; the cold months (November, December, January,) come next; the transition months (February, June and October,) next; and the wet months (July, August, and September,) produce least epizootic disease.* This is readily inferable from the record above given. As to the peculiarities of those seasons in which the disease was most virulent and fatal, I possess no data. The season preceding the Assam epizootic is stated to have been a dry one. (2) The extensive prevalence of an "epidemic" of fever seems to have in 1864 preceded or coincided with an unusual prevalence of epizootic cattle diseases in the Presidency Division. The cold weather of 1865-66 was marked by an early stoppage of rain, and a violent outbreak of fever and cholera in the district of Jessore, and cattle disease broke out violently to the south of the district and extended to Backergunge about the same time. On this head information is greatly wanting, and, now that attention is being directed to the subject, will, doubtless, in future epizootics, be furnished.

(1) XXX., p. 6.

(2) XXIX.

2. As to the *conditions of country and soil,* which either produce or favor the spread of epizootic diseases, it is difficult to give an opinion. We have seen that cattle diseases are prevalent all over Bengal, and while there is a general similarity between the state of surface and soil of each district, there is also a considerable variation in particular features and conditions. The most virulent epizootic recorded is the Assam murrain of 1853. This prevailed principally on the banks of the Brahmapootra in a damp jungly malarious tract. From a persual of the various papers collected, it is also evident that the disease is more prevalent and severe in the divisions of Nuddea, Burdwan, Chittagong, Cuttack, Assam, and Dacca, than in those of Patna, Bhaugulpore, Rajshahye or Chota Nagpore, though the difference is probably not a great one, and perhaps only apparent.

3. With respect to the *food* of cattle, Dr. Long lays considerable emphasis on bad food as a predisposing cause of the Assam plague: particularly coarse grass and old dry straw (3). The Civil Surgeon of Maldah says:—"The disease prevails most when cattle are fed upon grass from lands which have been submerged, and when freely fed in the month of August on fresh cut paddy straw" (4).†

(3) XXIX.

(4) VI.

* With regard to individual diseases, Khorah would seem to be most prevalent during or after the rains, Gootee during the hot months, and Puschima during the cold months.

† A very interesting observation confirmatory of this view has come under my notice: a gentleman in this district found that when his sheep were allowed to graze on grass which had been submerged by the unusually high inundation of this year (1867) they contracted and died of a disease exactly resembling Puschima. He lost thirteen sheep of this disease during the month of October. He then caused all his sheep to be house-fed, and the disease disappeared.

Mr. Terry in Midnapore writes:—"From long experience I find diseases among cattle begin when green food is scarce."(1) Mr. Eyre, Deputy Collector of Sarun, also instances "insufficiency of nourishing green food during the cold and hot seasons" (2) as a cause of epizootics. There can be little doubt that either an indigestible quality or an insufficient quantity of food as affecting the condition of the animal must be an important predisponent to disease.*

(1) IV.

(2) XV.

4. The *condition of the animal* was considered by Dr. Long as having an important predisposing effect in favor of infection. (3) Dr. Palmer remarks that in the Calcutta epizootic all kinds of cattle, well conditioned and strong, as well as weak and lean, were attacked. (4) He is of opinion that the eczema epizootica selects the ill-fed, over-worked and weakened constitution. (5) The truth seems to be that in a virulent epizootic all conditions of cattle are liable to attack, while in a less virulent visitation the weakly first succumb.

(3) XXIX.

(4) X., p. 2.

(5) X., p. 5.

5. As to the predisposing effect of *age and sex* there are no facts available, but these conditions have probably little or no influence in determining the course of the disease.

6. In regard to *unsanitary conditions,* overcrowding, damp, neglect of cleanliness, &c., there can be no doubt from analogy that these conditions must exert a baneful effect in favor of the spread and severity of the diseases under consideration. Dr. Long in his excellent report of the Assam epizootic insists strongly upon the predisposing influence of such conditions, and it is important to note that in this epizootic the cattle of the Revd. Mr. Higgs, which were more favorably circumstanced in these respects, suffered from a milder form of disease than was prevalent in his neighbourhood.† (6)

(6) XIX.

* Mr. Gudgin, Veterinary Surgeon, in a report on cattle disease in British Burmah, makes the important observation that cattle allowed to feed on the rank grass of the early rains after having been accustomed to the dry fare of the previous months are very apt to have "Black Quarter," an inflammatory fever accompanied by erysipelatous swelling of one or more limbs.—XXXVI., p. 3.

† The precise conditions of this kind which appear to affect animals in this country are—

1st.—Housing in low damp sheds where they are congregated in too great numbers, and this obtains more during and after the rains than at any other time of year. Cattle are carried away for the purposes of cultivation from the baree of the owner to bheels at some distance, and herded together in wretched sheds very slightly raised from the surrounding water. I have seen some miserable examples of this in the Sunderbunds.

2nd.—Overwork. During the busy season cattle are not only overworked, but worked walking up to their bellies in water.

3rd.—Neglect of rubbing down. This ought always to be done when the cow is wet from perspiration or water.

4th.—Bad food and drink, hard old straw, coarse grass and bheel water.

5th.—Working too long at a time in a hot sun without food.

The Assam epizootic was a peculiarly malignant one, and the description given of their condition shows that the comfort and cleanliness of the animals were greatly neglected. An important fact is also mentioned by Dr. Long in the same paper. He says that neither the Mesries nor their cattle suffered from the then prevailing diseases, and he attributes this to the care with which both men and cattle were housed and protected from the influences of damp and malaria. Mr. Lambert of Ceylon also attributes the immunity which his own cattle enjoyed for months from the disease which was prevailing in surrounding plantations to the "generous diet, absolute isolation and care bestowed upon his cattle."(1)

(1) XXVIII.

What the *exciting causes* of the various forms of epizootic disease under notice are, we have as yet no positive evidence, and the opinions entertained on the subject are rather inferences from the strict analogy which obtains between epizootics and epidemics, and from a consideration of the circumstances of the mode of appearance and spread of the diseases themselves.

1. The most probable theory on this subject is that these diseases are caused by a specific poison. In what manner this poison was primarily generated, whether it was originally derived from the soil, or whether it is now capable of being developed under peculiar conditions of atmosphere and soil, are questions which we cannot in the present state of science answer. Under favoring meteorological and other conditions* this poison becomes active, and entering into the animal along with the air it breathes, the water it drinks, or the food it eats, affects the blood and nervous system primarily, and the tissues of the body secondarily, setting up a definite and characteristic specific train of symptoms, multiplying in the body and stimulating a morbid activity of the various outlets of the organism, thereby causing eruptions and discharges by and along with which the poison tends to be eliminated from the body. These discharges are believed to contain the poison in abundance, and to be capable, in suitable circumstances, of generating the disease in another animal †.

2. The spread of the disease must depend upon the condition of the poison, the substances to which it may attach, or the agencies by which it may be removed from one locality to another. A gaseous poison will spread by simple diffusion through the atmosphere and will be wafted by the wind; a liquid poison will attach to water or to solid substances; a solid poison may be dried and wafted by the wind or

* These conditions are high temparature, moist soil, absence of rain, great evaporation, and, generally, states of atmosphere favoring putrefaction. That the diseases in question are capable of being generated in a locality, of being manifested in an endemic (enzootic?) or epizootic form is rendered highly probable by the observation of Major Lamb, who, in discussing the origin of an epizootic in Assam, (1867) observes that the disease made its appearance *simultaneously* in several mouzahs in the Durrung Mehal. (XXXV. 1).

† There is another source, if not of the development, at any rate, of the multiplication and intensification of certain poisons, particularly those of typhoid fever, cholera, and dysentry indicated by the observations and experiments of Simon Theirsch and Pettenkoffer, besides their development within the animal body, namely, that which takes place during the decomposition of accumulations of the evacuations of these diseases, under influences favoring putrefaction. (XXXII. p. 225 and 226.)

adhere to articles of clothing, houses, straw, &c., a parasitic infecting agent will be propagated by contact or by means of clothing, &c.* A poison which is generated under circumstances peculiar to a particular place is, with reference to human disease, endemic: when it is developed so intensely or abundantly as to spread over large tracts of country and affect masses of men, it is epidemic. These statements are at present generally held by physicians, and might be abundantly illustrated. I have brought them forward in the foregoing terse form, because they apply as appropriately to, and may be illustrated as aptly by, the epizootic diseases as by the epidemic. This will appear from a consideration of the "modes of origin and spread" of epizootics already dwelt on. We can also understand why the dry months are more favorable to the appearance and spread of these diseases than the wet, as already shown†.

There can be no doubt that the exciting causes of epizootics are constantly present throughout Bengal, giving rise in healthy seasons to sporadic cases, and mild visitations, and in unhealthy seasons, that is, under circumstances favoring their development, to wide spread and fatal disease.‡

3. Without enlarging on these speculative points, the practical and important point of *infectiousness* remains to be considered. The great majority of those who have reported on epizodics are agreed on this subject, and consider the diseases under discussion highly infectious. Such was the opinion of Dr. Long with reference to the Assam epizootic (1): of the Civil Surgeon of Maldah (2); of Dr. Coates of Chumparun (3); of Dr. Barry (4); of Dr. Palmer (5; of Dr. Anderson (6); of Dr. Bensely of Backergunge (7); of Mr. Sawers of Culna (8); and of numerous non-professional reporters (9); Dr. Long reports an instance of a diseased cow having infected five others (10) (Gootee). Dr. Palmer says that there

(1) XXIX.
(2) VI.
(3) VII.
(4) VIII., 1.
(5) X., p. 1.
(6) XIX.
(7) XIII., 1.
(8) VIII., 2.
(9) XXXV.
(10) XXIX.

* Mr. Herrold, (XVIII)., hints at the probability of flies being the means of conveying the infection from one animal to another. Not only is this highly probable, but the agency of jackals, dogs, cows, vultures, kites, &c., may be the means of infecting pasturages and dispersing disease of an epizootic character. If, as there is every reason to believe, the poison of specific diseases is portable, the possible agency of the lower animals in conveying it cannot be denied and may serve to spread even diseases peculiar to man. But in the case of carrion birds and animals, actually feeding on the corpse of a diseased animal, the probability of conveyance to other animals is much stronger. This constitutes one strong argument in favor of burial.

† The effect of rain in putting a stop to epidemics is a well-recognized fact. Macpherson says "the two most important agents in diminishing the prevalence of cholera, appear to be a heavy fall of rain and diminished range of temperature." (XXXI., p. 7.) In the October number of the *Indian Medical Gazette* for 1867, there is a remarkable illustration of an epidemic of cholera having been put a stop to by a heavy fall of rain.

‡ The analogy between the laws affecting the prevalence of cholera and the circumstances regulating the appearance and diffusion of epizootics is striking, and a perusal of Dr. Macpherson's work (Chapter I, III) will reveal the close correspondence. These circumstances are stated by Veterinary Surgeon Gudgin to be "epidemic influence," increased activity in the cattle trade, or when the healthy state of the herds of buffaloes has been lowered by drought, innutritious or insufficient food, or the digestive organs functionally deranged by sudden access to luxuriant pasturage. (XXXVI., p. 14.)

is ample proof that many healthy cattle contracted the disease (Puschima) at the exhibition, and carrying it to their homesteads infected others (1). The Magistrate of Backergunge states:—"The attack at Lahory was at first so mild that not more than two head of cattle perished in April. An inhabitant of the neighbouring village of Ghazeepore bought a cow apparently in good health at Lahory and took it home. Within a day or two of the purchase the animal sickened and infected almost all the cattle in the neighbourhood, large numbers of which perished."(2)* This is a most interesting and important observation, and tends to show that there must have been something in the sanitary condition of Ghazeepore predisposing to a severer form of disease than at Lahory. In such an instance as this it would be highly important to determine accurately what the difference of condition was which in one case determined a mild and in the other a severe form of the same disease. There can be little doubt that a diseased animal is capable of infecting others not diseased, and *under suitable circumstances* of spreading the disease. The evidence adduced is at any rate strong enough in favor of the infectious nature of the disease for practical purposes, and the belief should be acted on as if it were a certainty. When on the subject of treatment, I shall notice several striking instances of precautions against infection having apparently warded off the disease from large numbers of cattle.

(1) X., p. 1.

(2) XIII., 1.

The question of endemic origin or importation differs from that of infectiousness. The former is still under dispute and uncertain, and the latter beyond reasonable doubt. Mr. Gudgin, Veterinary Surgeon, in his history of the cattle disease (Puschima) of British Burmah (3) discusses the question:—was the disease imported? or is it indigenous? He inclines to the former opinion, and assigns the following reasons in support of his opinion:—

(3) XXXVI., p. 3.

1st.—There is every facility for importation of the disease into Burmah by the annual cattle trade between that and surrounding States.

2nd.—The disease has been more prevalent of late years, and there is reason to think that communication between districts has become more general and easy.

3rd.—If the causes of disease were indigenous, depending on some bad condition of soil and atmosphere, these would affect the general health and condition of stock. He admits, however, that the poison has during the last few years been always present in the country, and when favored by suitable circumstances has given use to wide-spread disease. This admission considerably weakens the force of the argument. Even with regard to human diseases it is most difficult to speculate on

* The report of Mr. Gudgin, Veterinary Surgeon, on cattle disease in British Burmah, details several remarkable instances of the disease (Puschima) having been introduced into villages by cattle brought from localities where the disease has been prevalent.

Mr. Gudgin also makes the important remark that places where cattle are bought and sold, and when there is every facility for importation, suffer more from cattle disease than isolated localities. (XXXVI., p. 4.)

the primary origin of specific disease poisons, as the whole subject is so wrapped up in hypothesis (1). These diseases must undoubtedly have been due to causes external to man, on their very first appearance, and it is highly probable that such causes and the conditions of their development still exist, yet so involved and difficult is the subject that even when a disease, such as cholera or puschima, is proved to have sprung up in a district at many independent centres at the same time, the advocates of the importation theory can ascribe the phenomena to the arousing into activity of numerous dormant poison germs by favoring physical conditions. As to cattle diseases data are wanting to determine the question, and for practical purposes it is safest and best to believe both hypotheses, namely; that epizootic diseases are sometimes due to endemic causes without importation, and sometimes to importation with favoring endemic conditions, as there are facts which favor both opinions, and they are not in any way opposed to or inconsistent with one another.

(1) XXXII., p. 218.

IV.—*Symptoms.*

In all the epizootic diseases under consideration, there are two classes of symptoms observable:—*1st*, general constitutional symptoms of a febrile kind merging into a typhoid condition and prostration in severe cases; and *2nd*, local symptoms of a more or less specific character.

I.—The symptoms of eczema epizootica, "foot and mouth disease" or khorah, vary considerably in degree from a simple vesicular eruption upon the feet and mucous membrane of the mouth with little or no constitutional disease, and small mortality, to an eruption of a vesicular nature, covering a large extent of the surface of the body, accompanied with febrile and other constitutional symptoms of a severe kind, resulting in death in a great proportion of cases. It is of importance to note this variation of symptoms, and it will generally be found that the severity of individual cases depends upon the mild or severe nature of the epizootic. The *period of incubation* of this disease has been very definitely fixed by a series of experiments conducted by the Royal Veterinary College in London. The disease was produced in healthy cattle by feeding them with hay saturated with the saliva of diseased animals. The effects were developed in 36 hours (2).

(2) XXX., p. 85.

These experiments are also interesting as demonstrating the contagious character of the affection, and showing that the discharges from site of specific local disease are capable of conveying the infection.

The importance of this fact, with reference to sanitary and preventive measures, is great. A severe attack of this disease is usually ushered in by fever of a remittent type. (3) Whether this is preceded by any signs of constitutional disturbance, as lassitude, restlessness, disregard of food, &c., does not appear. Shivering fits are described (4).

(3) XV., 1.
XXX., p. 86.

(4) XXX., p. 86.

(1) XXX., p. 86.
(2) XV.
XV., 1.
(3) XV., 1.
(4) XV.
(5) XXX., p. 86.
(6) XV.
(7) XV., 1.
(8) XV., 1.
(9) XV., 1.

Rumination is suspended (1); the appetite is lost (2); and there is great thirst (3); the skin is rough, hot and dry (4); the udder is hot and tender to the touch (5); the eyes and mouth water (6). In cows lactation is diminished (7). The urine becomes high colored (8), and diarrhœa of a dark green color and very fœtid is described (9).

(10) XXX., p. 80.

How soon after the appearance of the constitutional disturbance the specific local effects arise, I have no data to show. Sometimes the feet are mainly or exclusively affected, and sometimes the mouth, and in bad cases the eruption is found on the udder, the organs of generation, and the spaces between the digits (10).

(11) XXX., p. 87.

(12) XV., 1.

The eruption is purely vesicular, consisting of small blisters, containing a transparent fluid; the tongue, roof of the mouth and lips are covered with these. The coronets of the feet become hot and swelled, and similar vesicles are found between the claws. When the feet are severely affected lameness invariably ensues. (11) When the disease is fatal death is caused by the severity of the constitutional derangement and occurs on the eighth or ninth day (12). In most cases the general disturbance abates, the vesicles dry up and become crusts, the appetite returns, and the cow is well in fourteen or fifteen days.* The mortality of this disease varies with the type of the epizootic. It is put down by Mr. Stevens, on whose intelligent description I have drawn for much in

(13) XV., 1.

(14) XXII.

(15) XVIII., 1.

the foregoing, (13) at 25 per cent. of cases. Of 42 of the cattle belonging to the Royal Artillery at Cuttack, 34 had recovered and the remainder were convalescent when the report was written. (14) In this case the animals were carefully treated, and I am inclined to think that Mr. Stevens's proportion is rather high. Mr. Herrold (15) says that *if not well attended to* 10 per cent. of the animals die.

The *complications* of the disease, including the effects of want of proper care, are:—

(16) XXX., p. 87.
XXIII., 2.

1*st*.—Ulcers on the mouth and udder caused by breaking of the vesicles (16). These are often troublesome, and frequently those of the mouth occasion death through inability to take sufficient food.

(17) XXX., p. 87.
(18) XXIII., 2.

2*nd*.—Ulceration of the foot and disorganization of the horny material of the hoof (17), sometimes the hoof falls off (18); this event is generally the result of neglect of proper treatment.

* "Curable in ten days." Mr. Cockburn (VI.)

(1) XVIII., 1.
XV.

3*rd*.—Development of maggots and consequent ulceration and inflammation. (1) This also results from neglect of the proper measures to prevent the attacks of flies, and very often causes the death of the animal.

It is of extreme importance to bear these complications and their mode of occurrence in mind, because it is from them that in most cases death occurs, and they are as a rule preventable.

II.—I now proceed to the symptoms of the disease distinguished as "gootee" or "boshonto." In khorah the local manifestation constitutes the most prominent symptom of the disease, and except in severe cases or epizootics the constitutional disturbance is of secondary concern. In this disease, on the contrary, the local manifestation is of small concern, and the constitutional derangement most serious and severe. It is from the latter, the natural sequence and duration of constitutional symptoms, that the disease derives its specific character, more than from the eruption, though the latter is *when present* also characteristic enough. A comparison of the various accounts given of different epizootic manifestations of this disease clearly shows that there is a very considerable variation in the severity of the symptoms and type of the disease—that while in one case of epizootic the disease may be comparatively mild, and the mortality, though always great, not extreme, in another case of epizootic the type may be malignant and the mortality excessive. It will be also noted that in some epizootics of what was undoubtedly gootee no eruption was observed in many cases,* while the grouping and sequence of the symptoms leave no doubt that the disease was the same as that in which an eruption was observed. The character of any case in an epizootic must be considered in relation to the broad typical features of the disease as obtained from a generalized comparison of several well marked cases carefully examined, and I would strongly deprecate the tendency to remove individual cases of disease into another category, because a particular manifestation was absent or ill, developed. It is also to be observed that the word pustule has been undoubtedly used in the description of this disease by unprofessional observers in a loose and general sense, and much obscurity and confusion is introduced into the subject from the apparent application of the term to denote any eruption, whether vesicle (a small pointed bleb or bladder containing transparent fluids), pustule (a small more or less circular or rounded bleb or bladder containing pus or yellow matter) or crust (concreted lymph or pus embedded in small ulcer). This distinction ought carefully to be borne in mind in future descriptions of epizootics. The disease under notice is undoubtedly the most wide-spread and fatal in Bengal, and I shall therefore go into its symptoms in detail. I am fortunate in having myself seen and examined carefully several cases of the disease, and in having descriptions of the disease written by several medical officers, Dr. Long of Assam, Dr. Coates of Chumparun, the Civil Surgeon of Maldah, Dr. Jackson of Balasore, Dr. Green of Tipperah, and Dr. Bensley of Backergunge, and by several non-professional gentlemen of great intelligence.

* This is pointedly brought out by Mr. Driberg of Mungledye, Assam, who says that in the epizootic of 1867, "in some cases an eruption breaks out." XXXV., 3.

Having premised these general remarks, I shall first give the details of what I conceive to be a typical manifestation of the disease, and then a description of the severer forms.

As to the period of incubation of this form of disease, I have no facts from which to draw a reliable inference. It is probably short, judging from the observation of the Magistrate of Backergunge, already quoted (1) (p. 11.) The point might be easily fixed by observing how soon after the introduction of a diseased animal into a healthy locality or herd the disease appeared, or experimentally by inoculating healthy animals with saliva or lymph, or giving them food saturated with the former.

(1) XIII., 1.

The premonitory symptoms are stated by Dr. Long, (2) to be as follows:—The animal is observed to become listless and dull, to stand apart from the rest. The skin becomes dry and rough, and there is a short dry not frequent cough. The animal does not feed so heartily as usual, and in cows the quantity of milk is diminished.* A careful observer will probably in all cases be able to observe these symptoms of impending disease, which are generally overlooked. Their importance, with reference to treatment, cannot be over-rated.

(2) XXIX.

After this condition has lasted two to four days, fever, either preceded by shivering (3) or not, sets in. The appearance of shivering or fever marks the commencement of the *second or febrile stage* of the disease. It generally lasts two or three days (4)† and its symptoms are—

(3) XXV.
(4) XXIX.
VIII., 2.
XI., 2.
XVI., 2.
XIII., 1.
XXX.

1*st*.—Elevation of temperature; this is best observed in the axilla, at the root of the horns or in the inside of the ear.

2*nd*.—Roughness of skin caused by elevation of the hair (horripilatio) and dropping back of ears.

3*rd*.—Increased pulse and accelerated breathing.

4*th*.—Complete refusal of food.

5*th*.—Absence of rumination.

6*th*.—Intense thirst (5).‡

(5) XXIX.
VI.—VII.
XVI. 2.

7*th*.—Watering of eyes, which become inflamed, sometimes chemotic.

8*th*.—Slavering and discharge of watery fluid from nostrils. Dr. Long states that in this stage vesicles may be seen in the mouth.

9*th*.—Dry muzzle, which presents a curious reticulated appearance.

10*th*.—Cough occasionally. (1)

11*th*.—Swollen tongue covered with pointed elevations.

(1) VI.
XI., 2.

* Mr. Driberg of Mungledye, Assam, describes the premonitory symptoms as partial loss of appetite and great lassitude. (XXXV., 3.)

† Dr. Coates states the duration of the fever to be eight or nine days (III.) This I think must be overstated.

‡ Major Lamb in an epizootic of gootee in Assam states as one of the symptoms,—"Refusal of food and drink." XXXV., 1.

12*th*.—Urine high colored, like blood.

13*th*.—General appearance of severe sickness, head drooping, back up, flanks hollow, posture not altered, and eye dull or bleared.

14*th*.—In cows lactation is completely suspended in this stage. (1)

(1) XV. 1.

These are the manifestations of a general febrile disorder, and in varying degrees of intensity may be noted in every case.

It were desirable that the variations of temperature and pulse were noted in order to determine accurately the exact character of the fever. This could only be done by careful repeated observations of the same animal.

On the third or fourth day (reckoning from the commencement of second stage) *the third or eruptive stage* sets in.

The eruptive nisus affects the mucous membrane of the intestinal tract causing first diarrhœa and then dysentery, and the skin of the body, causing an eruption.

The diarrhœa usually precedes the appearance of the eruption by a day. Dr Long says that it supervenes on the second day (2); Dr. Green says the third day (3); Mr. Sawers the second or third day (4); and Dr. Bensley the third or fourth day (5). The stools are described as "broken up, slimy, frequently fœtid" (6); "serous mucous and sometimes bloody" (7); "brownish, black, watery and very offensive" (8); "thin but foul in smell," "watery", &c. All observers agree in stating that dysentery succeeds to the diarrhœa. Its period of appearance is not very well fixed, but the fifth day may be taken as an average.

(2) XXIX.
(3) XVI., 2.
(4) VIII., 2.
(5) XIII., 1.
(6) XXIX.
(7) XIII., 1.
(8) XVI., 2.

The eruption makes its appearance on the fourth or fifth day (9). It is essentially vesicular. Dr. Long calls it an "eruption of dry pustules"—scabs(?) Dr. Coates describes "papules succeeded by pustules;" Dr Jackson, "vesicles which subsequently maturate." Dr. Green, "minute elevations beneath the skin;" Dr. Bensley, "pimples or scabs." In the cases which I examined, I observed only scabs, consisting of small black or light yellow crusts set in small ulcers and surrounded by a ring of redness. The extent of the eruption and the size of the vesicles varies in different cases. Most commonly the udder, the stomach, the axillæ, and lower part of the neck only are covered; but in some cases the whole body breaks out. Dr. Coates states that the mouth, palate, and alimentary canal are attacked with pustules. Mr. Stevens says that it extends to the tongue and throat.* The hair in the vicinity of the vesicle loosens and may be wiped off. The extent to which the hair may be removed is a good index of the severity of the eruption. In some cases it is removable to such an extent that the skin is wholly denuded of pile, red and raw (10).

(9) VIII., 2.
XI., 2.

(10) 1, 2.

In some cases there is no eruption observed, and some epizootics are

* Sore feet and lameness are described by Mr. Driberg in Assam (1867) XXXV., 3.

characterised by greater freedom from eruption than others. These appear to be more malignant than those in which a copious eruption appears. Some observers have remarked that cases in which the eruption is copious do better than those in which it is scanty or suppressed.(1) This accords with what I have myself been told by natives. I doubt much if any case which survives the fifth day will on careful inspection be found free of a cutaneous affection of some sort, and I suspect that small papules, pimples or crusts giving a sense of roughness to some parts of skin, will be found in all such cases; any case dying before the fourth day will of course show no eruption. During this stage the constitutional symptoms undergo a change. The fever intermits, assumes a typhoid type or yields to prostration. The pulse becomes small and weak retaining its rapidity. The temperature diminishes, and the extremities become cold. Refusal of food and suspension of rumination continue; thirst abates; the eyes become redder and the discharge turbid or actually purulent. The nostril and mouth discharges, are apt to become brownish and fœtid. Aphthous-looking ulcers are found sometimes on the lips and gums. The tongue becomes more swollen and dark. Prostration increases, and the animal eventually lies down. Wasting sets in. The glands of the throat are observed to swell in severe cases, and in some cases the stomach. Flies attack the discharges and mucous orifices. Ulcers are prone to form, and the animal is liable to die of exhaustion. When death ensues it does so at a period varying from five to ten days, and recovery is slow and in many cases imperfect.

(1) VI.
XX.

The *duration* of the disease from the commencement of the first stage to the occurrence of death or a change for the better is put down by Dr. Long at twelve days (2), by Mr. Hope, at five to ten days (3), by Mr. Sawers at five to eight days (4), by Lieutenant-Colonel Agnew at seven to fifteen days (5), by the Deputy Magistrate of Behar, at a week to ten days (6), Mr. Eyre at Sarun, at five days (7), by Mr. Stevens at eight or nine days (8), by Dr. Green at six or seven days (9), by Dr. Jackson, at ten or twelve days (10). Four to seven days is reported from Beerbhoom as the duration (11), five to seven from Darjeeling (12), five to eight from Jessore (13), four to fifteen from Durrung (14), six to seven from 24-Pergunnahs (15), six to seven from Singbhoom (16), and two to ten or eleven days from Jessore(17). The duration of the disease in cases which recover, that is, the time which elapses between the first appearance of symptoms and the complete restoration of health, is from fifteen to twenty days (18).

(2) XXIX. (10) XI., 2.
(3) VII., 3. (11) XVII.
(4) VIII., 2. (12) XXXV., 1.
(5) XIV. (13) XVIII.
(6) XV. (14) XIX.
(7) XV. (15) XX.
(8) XV., 1. (16) XXXIII., 5.
(9) XVI., 2. (17) XXV.

(18) XV., 1.

Mr. Sawers of Culna says that a second attack of gootee is "almost unknown" (19). This is a highly important observation, and the subject merits careful attention and inquiry, with special reference to the subject of inoculation.

(19) VIII., 2.

The number of cattle lost from this disease throughout Bengal yearly is very great; the mortality in some accounts is put down as hundreds (1), in others (2) as thousands (3). Particular epizootics have been extremely fatal. In Assam the loss of cattle is estimated at 1,20,000 (4), in Backergunge, at 30, or 40,000 (5), in Tipperah, at 15,482 (6), and in one Sub-division of Jessore, at 12,000.(24) The rate of mortality is very high. The estimatos vary somewhat, and are all more or less speculative and perhaps exaggerated. Dr. Long estimates that 70 per cent. of the whole stock were attacked, and 45 per cent. or 64·2 per cent. of those attacked, died (7). Dr. Jackson says that one-third to two-thirds of those attacked die (8). In Tipperah the mortality was reckoned to be 90·5 per cent. (9).

(1) IV., 1.
I., 2.
(2) X.
(3) XXIX.
(4) XIII., 1.
(5) XXI.
(6) XXV.
(7) XXIX.
(8) XI., 2.
(9) XXI.

In the station of Commillah of 108 cattle 60 or 55 per cent. were attacked, and 55 or 50·9 per cent. of the whole (91·5 of the attacked), died (10). My own inquiries lead me to conclude that about 90 per cent. of the cattle were seized, and that about 90 to 95 per cent. of those attacked died (11).* These statements are vague and go no farther than to show that the mortality is very serious in all epizootics of this nature and more so in some than in others.

(10) XVI., 1.
(11) XXV.

In the severer manifestations of this disease, such as were observed by Dr. Long in Assam, the following additional symptoms were noted :—

1*st.*—Earlier fœtor of the breath and discharges.

2*nd.*—Earlier and more severe swelling of the glands of the neck, proceeding to suppuration and ulceration.

3*rd.*—More violent fever at the commencement, and more rapid wasting and prostration.

4*th.*—Earlier cooling of the body and wasting.

5*th.*—Dejections more fœtid and dysenteric.

The complications which are apt to occur in course of this disease are :—

1*st.*—Inflammation of the lungs. This I am inclined to think is rare. The symptoms of this event are frequent cough, accelerated breathing, quick pulse, evident pain in one or both sides, increased by pressure, a peculiar low grunt or loud moan and dulness on percussion, a crackling sound being heard when the ear or stethoscope is applied.†

2*nd.*—Ulceration of the vesicles on the udder or mouth.

3*rd.*—Confluence of those on the skin.

4*th.*—Ulceration of the glands of the throat.

* Mr. Stevens says that the proportion of deaths to seizures is 60 per cent. XV., 1.

† This indicates pneumonia: a wheezing, whistling, or bubbling sound will indicate bronchitis.

5th.—Development of maggots in the ulcers or at the mucous orifices.

6th.—The condition of "fardel-bound," or stuffing of the third stomach with dry food. This condition can hardly be recognized unless evident pain or distension of stomach with grunting lead to a suspicion that it exists. It should, however, be guarded against in every case by means to be afterwards detailed, because *post mortem* examination reveals its frequent occurrence, and the disease is of itself sufficient to kill the animal.

7th.—Tympanitis or flatulent distension of the first stomach probably dependent in most cases on the preceding condition, but occasionally perhaps caused otherwise. This condition cannot be mistaken, the belly becoming enormously swollen.

8th.—Erysipelatous inflammation of the connective tissue. This was more particularly observed in the malignant epizootic of Assam.

III.—Before going on to describe the non-eruptive epizootics, I shall here give for comparison a short detail of the symptoms of true cow-pox vaccinia. This is all the more necessary, as the disease considered in the preceding section is frequently called cow-pox, simply because it is characterised by an eruption (pocks) affecting cattle.

In vaccinia the constitutional symptoms are slight or wanting, and the local symptoms or specific manifestations well marked and prominent. The latter constitute the essence of the disease.

After a period of incubation of from six to nine days (1), a faint blush may be observed upon the udder, which is hot and tender. This continues for two to three days, and is succeeded by a patchy redness quickly followed by the appearance of raised papillæ or pimples. In three to five days these increase to the size of a pea, and become vesicles containing a transparent viscid fluid. These increase to the size of a horse, bean, are depressed in the centre, and are round or oval in shape, measuring eight to ten lines in diameter. In two or three days they becomes yellow and are converted into pustules, which assume an acuminated form and contain a thick, viscid, yellowish material. A scab or crust ultimately forms. These are dark, brown or black, solid, round, flat or uniform, and are embedded in a small pit with a raw surface and white central slough. They spontaneously separate on the twentieth or twenty-third day, leaving a shallow, smooth, oval, or circular pit of a pale rose or whitish color, with some traces of induration around it.

(1) XXXI., p. 273.

The constitutional symptoms are slight fever, dry muzzle, slightly accelerated breathing, fastidious appetite, and diminution of the secretion of milk. These appear after the local symptoms manifest themselves, and decline as they advance (2). Cattle suffering from this disease are liable to a purely vesicular eruption over the body, which appears on the ninth or tenth day of the vaccine disease (3).

(2) XXX., p. 230.
(3) XXXI., p. 276.

"The vesicles within 24 hours contain a pellucid serous fluid raising the epidermis. On the following day they become turbid, the cuticle collapses or bursts, and a thin, brittle, flimsy crust forms and speedily falls off; successive crops continue to form and desiccate for three or four weeks."

IV.—The terrible epizootic known as puschima, and which Dr. Palmer believes to be identical with rinderpest, is characterised by severe and malignant constitutional symptoms, the absence of any cutaneous eruption, and by specific lesions of the mucous and intestinal track with swelling of the adjacent glands. The disease may be divided into three stages, premonitory, febrile, and diarrhœic.* In describing these I shall mainly follow the careful and exact observations of Mr. Rutherford, referring for confirmation to other records.

The period of incubation appears to be short. In the Ceylon epizootic it is stated that a few days only elapsed after removing the cattle to a place where they were exposed to infection, when the first case appeared. (1) Mr. Floyd removed a cow laboring under disease from the Alipore Exhibition to his farm. In a week another cow was taken ill.(2)

(1) XXVIII.
(2) X., p. 3.

Mr. Herrold states that a few days after the arrival of some new cattle at Darjeeling two of them took ill.(3)

(3) XVIII.

These data are very vague, but they point to the probability of a short period of incubation.† In this disease death may occur in a few hours after seizure.

When the case goes through its regular stages, sequence of symptoms, the following phenomena may be observed:—

(*a.*) The premonitory stage is marked by dulness, disinclination for exertion, refusal of food, restlessness, neglect of calf, failing in milk, and other signs of discomfort and disorder. The duration of these symptoms is not noted, but it is probably shorter than in gootee, and will, I think, be found to be in a direct proportion to the severity of the subsequent disease.

* Mr. Gudgin, in his excellent account of this disease in Burmah (XXXVI., p. 16) describes three stages, febrile, diarrhœic, and dysenteric; but I consider my own division more natural, and cannot assent to the propriety of splitting up the stage of morbid elimination into two. Indeed, four stages may be distinguished without that, viz., 1, incubation; 2, premonitory; 3, febrile, and 4, diarrhœic.

† Mr. Gudgin, Veterinary Surgeon, in his report on cattle disease (puschima) in British Burmah, has determined the period of incubation, with considerable accuracy, to be five or twelve days. This is proved by the number of days which elapsed in several cases between the arrival of cattle in a village and the breaking out of disease; five days in one instance, six days in another, and five in a third. He surmises that the period of incubation depends upon the health and idiosyncrasy of the animal infected. XXXVI. 9.

It is now positively known that the animal is capable of propagating the disease during the stage of incubation. (Report of Royal Commission.)

(*b*.) The febrile stage is in some cases ushered in by shivering. (1) This is followed by appearance of fever of a remittent type.

(1) XXIV.

The symptoms of this stage are :—

1*st*.—Elevation of temperature. This is best observed in the horns and ears which are hot with distinct pulsation of the arteries. The extremities are alternately hot and cold.

2*nd*.—The skin is hot and dry and occasionally clammy, and sweating is sometimes observed; the coat stares (horripilatio), the ears also drop. (2)

(2) XIX.

3*rd*.—Pulse and breathing accelerated.

4*th*.—Total refusal of food.

5*th*.—Rumination suspended. (3)

6*th*.—Intense thirst is described by Mr. Herrold (4), and by Mr. Norman (5); but Mr. Rutherford states that the animal refuses drink; in this he is supported by Mr. Stevens (6), who says that the animal *can't* drink, also by the Magistrate of Bograh (7).*

(3) XIX.
(4) XVIII.
(5) XIX.
(6) XV., 1.
(7) XXIV.

7*th*.—Eyes dull and expressive of pain, conjunctivæ red, and towards the inner canthus ecchymosed spots are sometimes seen. The eye becomes duller, and there is a discharge of tears.

8*th*.—Discharge from mouth and nostrils. The former is watery, gradually becoming muco-purulent. The discharge and air expired through the nostrils are fœtid. A sticky saliva, mixed with air, dribbles from the mouth. The mouth is hot and breath very fœtid; in some cases slight ulcerated spots are observed on the Schneiderian membrane, which is of a deep red hue, small, superficial, irregularly edged, and of a yellow tinge. In some cases also the mouth opposite the incisor teeth shows a few sores.

9*th*.—Muzzle dry, hot, and glazed, marked by two streams of watery discharge from the nostrils. Occasionally a few drops of moisture are exuded, which do not coalesce.

10*th*.—Cough is noticed in some instances. It is not constant nor characteristic.

11*th*.—Tongue swollen and coated with mucus and saliva.

12*th*.—Urine diminished in quantity, of a high color and strong smell.

* Mr. Gudgin, Veterinary Surgeon, in describing the cattle disease in British Burmah, states that "water slowly and with difficulty is partaken of to the end." He also describes cattle as taking to the nearest marsh and immersing their bodies in water. (XXXVI., p. 10.)

13*th*.—Posture and general appearance indicative of severe distress, the animal stands perfectly still, or lies down and groans. (1)

(1) XIX.

14*th*.—In cows the secretion of milk is early diminished, becoming gradually less. It is of bad quality and of a darker color than usual.

I have arranged the symptoms of this stage on the same plan as those of gootee, in order to exhibit their great similarity, almost identity. This is all the more striking when we consider that each detail presents, not the observations of one man who might be prejudiced in favor of recognising such a similarity, but the independent observations of different men, writing at different times, of different epizootics in different places, and in each case these are quoted as nearly as possible in the words of the observers.

There is, however, one set of symptoms of great importance which have been noted in puschima and not in gootee. These are the *spasmodic movements*. Mr. Rutherford describes catching of the flanks and frequent twitching of the muscles of the flank.

Other observers are silent on this subject, but the phenomena are such as would probably escape the observation of non-professional observers.

The bowels are natural or constipated (2) in this stage. The throat and fauces are inflamed, and the glands of the throat begin to swell. (3)

(*c*.) It is not clear from the several accounts of this disease how long the second stage lasts, or when the third stage sets in. The period probably varies considerably. Judging from a case detailed by Mr. Greenhill (4) the period of duration appears to be twenty-four hours, and the purging sets in on the second day. Mr. Rutherford talks of its setting in early. (5) The discharges are described as "thin, ejected with violence, mixed with mucus and air, and shortly with blood."* They are very fœtid, tenesums subsequently ensues, the amount of blood increases, the dejections become like dirty water, and are discharged with violence. No skin eruption of any sort is described by any observer.

(2) XIX.
XXXVI., p. 10.
(3) IV.
VIII., 2.
XV. XV., 1.
XVIII., 1.
XIX.
(4) X., p. 9.
(5) X., p. 3.
VIII., 2.

The other symptoms now undergo a change. The fever assumes a low typhoid form, the temperature falls, and the animal becomes cold. Remission of the fever takes place once a day or once in two days.

The skin becomes cold and clammy and sometimes cold sweats break out.†

The pulse becomes quick and tremulous, and breath short. The discharges from eyes, nose, and mouth, become more fœtid and purulent or sanious. Flies swarm round the muzzle and deposit their eggs within

* "A dark coffee color tinged with blood, but more frequently of a dirty yellow color, thin and offensive to the smell." (XXXVI., p. 10.)

† Mr. Gudgin, Veterinary Surgeon, (XXXVI., p. 16,) describes a reddened condition of the skin between the hind legs with cracks and sores in some cases.

the lids, nostrils, or lips. The expression becomes duller. The swelling of the throat is more pronounced. Complications involving the stomach and lungs are apt to appear.

Prostration, exhaustion, and wasting advance rapidly.* The bowel discharges become dysenteric and more offensive, and in the majority of cases the animal succumbs in a day or two after the commencement of this stage. The *duration* of this disease, which presents a highly important contrast with gootee, is given by Mr. Rutherford as an average of four days (1). In Ceylon the average duration seems to have been from 24 to 36 hours (2). Dr. Anderson says that death takes place in from three to five days (3). In Burdwan the duration is said to be 48 hours (4). Mr. Sawers says that puschima proves fatal in 24 to 48 hours (5). In Bograh the disease is said to last three days (6). In Patna the animal is said to die in five or six days (7). Mr. Norman states seven or eight days (8), and Mr. Stevens eight or nine days (9). As to the time in which death occurs. In Darjeeling Mr. Herrold says "no case that I am aware of, except one, extended to the fourth day," and many succumbed in less than 36 hours." (10).* The average of four days may be taken as a very approximate one.

(1) X., 3.
(2) XXVIII.
(3) XIX.
(4) IV.
(5) VIII., 2.
(6) XXIV.
(7) XV., 1.
(8) XIX.
(9) XV., 1.
(10) XVIII., 1.

Although the absolute loss of cattle in Bengal is probably less from this form of disease than from gootee, the ratio of deaths to seizures is much greater.† Mr. Rutherford computes the early mortality of the Calcutta epizootic to have been 90 per cent., and the later 50 per cent. In individual instances the loss was even greater. Mr. Floyd and Mr. Stalkart are said to have lost *all* their cattle (11). At Seebpore of 13 head of cattle 13 were attacked and all died. Mr. Stevens reckons the mortality at 60 or 70 per cent. of attacked (12). Mr. Herrold in about 15 days "had not one left of a herd of upwards of 40 head" (13). Dr. Palmer talks of the disease "making a clean sweep of any yard into which it entered" (14). Dr. Anderson says that whole herds are caried off in a few days (15). Mr. Deare states that "when it enters a homestead it clears the stall" (16). The Magistrate of Bograh states the mortality to be 95 per cent. of attacked (17), and Mr. Gudgin, Veterinary Surgeon 85 per cent. (18).

(11) X., p. 3.
(12) XV., 1.
(13) XVIII., 1.
(14) X., 2.
(15) XIX.
(16) XIX.
(17) XXIV.
(18) XXXVI.

* The animal assumes the recumbent position, and the head is either turned to the side or extended to the front in a line with the body (XXXVI., p. 10).

† Mr. Gudgin, Veterinary Surgeon, states that the majority of animals affected die on the fifth or sixth day, and that restoration to perfect health occurs in about thirty days.—(XXXVI., p. 10).

‡ In British Burmah, according to Veterinary Surgeon Gudgin's interesting report, the loss of cattle from puschima is most severe. In the space of one or two years from half to two-thirds of the cattle of particular villages were swept away. Mr. Gudgin talks of the disease "decimating herds," "killing off by hundreds," "sometimes making a clean sweep of the whole," &c. He estimates the loss in 1865 at 100,000.

These statements accord very closely, and exhibit the terrible nature of the disease. Recovery, when it occurs, is tedious. Mr. Gudgin, (1) Veterinary Surgeon, says that the disease passes off about the thirteenth or fourteenth day, and that restoration to perfect health takes place about 25 days subsequent to the termination of the attack.

(1) XXXVI., p. 10.

The same authority makes a statement at page 16, that "animals that have had the disease are secure against future attacks." The importance of this statement, with reference to inoculation, cannot be overrated, and careful observations are required to verify it or otherwise.

The *complications* which are prone to occur in the second stage are :—

1*st.*—Inflammation of the bronchiæ or lungs.

2*nd.*—Tympanitis.

3*rd.*—"Fardel bound."

These present the same symptoms as in gootee.

V.—For the sake of completeness I shall here insert a short sketch of the symptoms of "rinderpest," partly taken from Dr. Palmer's paper (2), and partly from Mr. Dobson's book. (3)

(2) P. 7.
(3) P. 162.

In this disease we may also describe three stages, a premonitory, febrile, and diarrhœic.

The period of incubation varies from 7 to 14 days :—

1. *Premonitory stage.*—The principal symptoms are want of appetite, staring coat, diminution of milk, suspension of rumination, and other signs of severe illness.

2. The *febrile stage* is marked by :—

1*st.*—Elevation of temperature. This is variable and transitory.

2*nd.*—Skin hot in some places, especially between the legs, and exudation succeeded by cracks and sores take place. Hair staring.

3*rd.*—Pulse and respiration increased in rate.

4*th.*—Total refusal of food.

5*th.* Rumination suspended.

6*th.*—Thirst is not described; one account says that in most cases water is refused, another that water will generally be partaken of even to the end.

7*th.*—Eyes water and are red and expressive of suffering.

8*th.*—There is a discharge from the mouth and nostrils. Former hot, red, and inflamed, with often raw spots here and there. Breath fœtid.

10*th.*—Cough is noticed in some instances.

11*th.*—The animal stands with back arched and legs gathered up under the body. If moved it staggers.

14th.—The secretion of milk is quickly arrested.

The *spasmodic symptoms* in this disease are very strongly marked from the commencement to the end: they are described as tremors of the muscles, and spasmodic twitchings of the voluntary muscles of the neck, shoulders, and hind quarters. They pass off a few hours before death.

3. The preceding symptoms having lasted about 24 hours, diarrhœa sets in followed by dysentery. The evacuations are said to be slimy, liquid, of a dirty yellow color, occasionally tinged with blood, and tenesmus is described. The general symptoms now change. The fever passes away, the animal becomes cold, the extremities and spine being particularly so. The pulse disappears, and breathing becomes short, quick, and painful. The discharges from nose and mouth become purulent, the fæces more offensive. Prostration rapidly gains, the animal lies down, twitching stops, and death speedily ensues.

The duration of this disease is stated to be from 12 hours to 5 or 6 days, and rarely 8 or 9: the percentage of deaths to seizures being 90.

I append a tabular detail of the symptoms of khorah, gootee, puschima, and rinderpest, for the purposes of comparison.

It is to be remarked that no mention is made of swelling of the throat in either account of the latter disease. It is also to be noted that this symptom is not described by Mr. Rutherford in the Calcutta epizootic, nor by Mr. Lambert in the Ceylon disease, though almost all other accounts of puschima distinctly allude to it.

Comparative view of the symptoms of "Khorah," "Gootee," "Puschima," and "Rinderpest."

Stages and symptoms.	Foot and mouth disease, Khorah.	Gootee.	Puschima.	Rinderpest.
Period of incubation ...	36 hours ...	Not known ...	A few days, two ...	Seven to fourteen days.
I.—Premonitory stage ...	None described ...	Dulness and listlessness in action; dry and rough skin; short dry cough; failing in milk.	Dulness and listlessness, refusal of food, failing in milk, restlessness, neglect of calf.	Suspension of rumination, want of appetite, staring coat, failing in milk.
Duration ...	....	Lasts two to four days ...	Not noted ...	Not noted.
II.—Febrile stage				
Shivering ...	In some cases ...	In most cases ...	In some cases ...	In most cases.
Fever ...	Slight in most cases ...	Severe ...	Remittent ...	Low type.
Temperature ...	Elevated ...	Much elevated ...	Elevated ...	Elevation, but variable and transitory.
Skin ...	Rough, hot, and dry ...	Hot and rough horripilatio ...	Hot and dry or clammy, horripilatio.	Hot and cold alternately, horripilatio.
Pulse ...	Not noted ...	Increased ...	Accelerated ...	Accelerated.
Respiration ...	Ditto ...	Accelerated ...	Ditto ...	Short and quick.
Appetite ...	Bad ...	Lost ...	Lost ...	Lost.
Rumination ...	Suspended ...	Absent ...	Absent ...	Absent.
Thirst ...	Increased ...	Intense ...	Accounts vary ...	Accounts vary.
Eyes ...	Water ...	Inflamed and water ...	Inflamed and water ...	Inflamed and water.
Nostrils ...	....	Viscid discharge ...	Viscid, fœtid discharge ...	Viscid, fœtid discharge.
Mouth ...	Discharge from ...	Sticky discharge from, ulcers on lips sometimes.	Sticky fœtid discharge from, ulcers on lips occasionally.	Discharge from, fœtid, raw spots.
Muzzle ...	....	Hot and dry ...	Hot and dry ...	Not noted.
Cough ...	None ...	Occasional, short and dry	Occasional, short and dry ...	Occasional.
Tongue ...	....	Swollen, covered with mucus.	Swollen, sometimes ulcerated at base.	Not noted.
Urine ...	High colored ...	Scanty and high colored	Scanty and high colored ...	Ditto.
Posture, &c. ...	....	Head down, ears drooping, back up.	Head down, ears drooping, back up.	Head down, ears drooping, back up.

TABULAR STATEMENT OF POST MORTEM APPEARANCES OBSERVED IN SEVERAL EPIZOOTICS.

Observer.	I.—External Appearances. 1. Condition.	2. Skin, &c.	II.—Cranial Cavity. 1. Skull.	2. Membranes.	3. Brain.	III.—Thoracic Cavity. 1. Narse.	2. Larynx and Trachea.	3. Lungs.	4. Heart and vessels.
Long. ssam Epizootic of 1853. Several cases.	Great emaciation.	Subcutaneous and intermuscular cellular tissue affected with gangrenous inflammation.	Not examined.	Not examined	Not examined.	Lining membrane inflamed.	Mucous membrane inflamed to smallest ramifications, patches of gangrenous inflammation.	Contained abscesses, infiltrated with dark brown livid pus.	Heart softened, pale and yellow, contained thick black grumous blood. Arteries stained internally, veins contained black blood.
Lambert. ylon Epizootic of 1842. Several cases.	Not noted.		No note taken.			......	Inflamed and full of frothy mucus.	Inflamed	Healthy, filled with coagulated blood.
Rutherford. alcutta Epizootic of 1864. Several cases.	Not noted.		Condition not noted.			Mucous membrane inflamed, thickened and covered with exudation, abrasions observed and ova of flies.	Larynx inflamed, Trachea less so.	No disease noted.	Blood grumous ...
McLeod. ssore Epizootic of 1867. One case.	Rather emaciated.	Skin rough. A few crusts on the neck, belly and udder with surrounding redness, no pustule.	Healthy ...	Congested ...	Healthy ...	Mucous membrane thickened and inflamed.	Lining membrane red, covered with viscid mucus, mucous tissue infiltrated. Tracheal mucous membrane congested to smallest ramifications.	Pleuræ healthy, lungs of a pink color, uniformly congested, slightly condensed, no hepatization, vessels contained clots.	Pericardium healthy, heart contained firm dark clots, small white clot, in right ventricle clots extended into large vessels. Walls apparently fatty. Blood grumous.
nderpest from eterinarian" of st July 1857. ted by Dobson, p. 167. everal cases.	Not noted.		Healthy ...	Increase of fluid in the ventricles and theca vertebralis.	Healthy ...	Mucous membrane inflamed, covered with points of ulceration and shreds of lymph.	Larynx occasionally ulcerated, mucous membrane of larynx and trachœa covered with a layer of lymph.	Healthy ...	Healthy, blood fluid and dark.
inary Surgeon P. Gudgin. ah Epizootic of 1868. y-three cases.	Not noted ...	Skin between hind legs presented redness or a few cracks and sores.	Healthy ...	Membranes congested. Lateral ventricles and theca vertabralis contained an unusual quantity of fluid.	Healthy ...	Schneiderian membrane intensely congested, of a deep red color, dotted over with raw spots. Points of ulceration or patches of exudation; more diseased posteriorly.	Lining membrane congested and covered with exudation; congestion extends into the ramifications of the trachœa.	No disease of pleuræ or effusion, lungs emphysematous and invariably congested.	Muscular substance flaccid, cavities empty, blood very dark, fluid, and coagulating on exposture.

Observer.	IV.—Abdominal Cavity. 1. Mouth and Pharynx.	2. 1st Stomach.	3. 2nd Stomach.	4. 3rd Stomach.	5. 4th Stomach.	6. Small In.	7. Large In.	8. Liver.	9. Spleen.	10. Kidneys.
Long. ssam Epizootic of 1853. Several cases.	Mucous follicles ulcerated, mucous membrane inflamed, detached and shreddy, contained brown fœtid fluid.	Enormously distended, mucous membrane inflamed in large patches.	Contained a dark green fluid staining it.	Contained a similar fluid, mucous membrane inflamed.	Mucous membrane inflamed.	Inflamed especially upper and lower part.	Contained lumpy fæces and a yellow fluid.	Soft, dark, and livid. Gall bladder moderately distended.	Engorged, like a bag of blood.	Slightly congested.
Lambert. ylon Epizootic of 1842. Several cases.	Œsophagus inflamed, mucous membrane one mass of pus.	No disease ...	Nothing particular.	Contained layers of hard food, "fardel bound."	Inflamed ...	Inflamed ...	Inflamed and ulcerated, rectum particularly so.	Turgid and inflamed.	Nothing noted.	Nothing noted.
Rutherford. alcutta Epizootic of 1864. Several cases.	Tongue swollen, effusion into muscular substance, mucous membrance thickened and covered with mucous purulent fœtid secretion. Mucous membrane of pharynx inflamed, thickened and covered with greyish exudation. Œsophagus inflamed.	Inflamed ...	Inflamed ...	Occasionally "fardel bound."	Empty: mucous membrane red, dark red in patches, swollen and thickened, easily detached.	Inflamed similarly to but less intensely than stomach, occasional ulcers met with.	Empty and slightly affected. Rectum much inflamed.	Highly congested and enlarged.	No disease ...	No disease.
McLeod. ssore Epizootic of 1867. One case.	Mucous membrane of mouth swollen, tongue of a livid color, covered with viscid secretion; membrane thickened. Mucous membrane of pharynx intensely inflamed, covered with a thick white pellicle, membrane much thickened and infiltrated. Tonsils, thyroid, and other glands of neck enlarged and engorged.	Contained a small quantity of fœtid grumous matter, inflamed and mucous membrane abraded.	Contained a quantity of dry and undigested food, reticulœ inflamed looking.	Stuffed with layers of dry aliment, "fardel bound."	Contained an enormous quantity of dry food, mucous membrane very dark.	Ileum much congested, small lenticular elevations on mucous membrane, containing wax-like substance and surrounded by congestion.	Upper portion contracted and pigmented, lower portion, congested intensely and abraded; mesentric and other glands enlarged and engorged.	Yellowish color, and friable. Gall bladder distended with bile.	Engorged, adhering to stomach and diapraghm.	Pyramids c... gested, u... of a dark c...
nderpest from eterinarian" of st July 1857. ted by Dobson, p. 167. everal cases.	Mouth and pharynx inflamed and ulcerated, follicles filled with effused lymph and ulcerated; tonsils inflamed, Œsophagus healthy.	Mostly healthy, epithelium peels off, in some cases disclosing turgid vessels.	Mostly healthy, desquammation and congestion in some cases.	Contents dry and hard, "fardel bound."	Mucous membrane highly congested, follicles filled with lymph.	Inflamed and tinged throughout. Peyer's patches sometimes covered with layers of lymph and often ulcerated.	Extensively ulcerated, studded with deposits of lymph.	Healthy. Lining membrane of gall bladder covered with lymph.	Healthy ...	Healthy.
inary Surgeon P. Gudgin. ah Epizootic of 1868. y-three cases.	Tongue furred anteriorly, base congested: swollen, follicles filled with lymph, muscle soft, showing points of extravasation. Fauces and pharynx highly congested and covered with greyish exudation. Soft palate congested with spots of abrasion. Œsophagus healthy.	Contained a quantity of soft food, mucous membrane healthy.	Contained a large quantity of soft food, mucous membrane healthy.	Contents in most cases soft, lining membrane healthy.	Lining membrane thickened and ulcerated, yellow deposits of lymph upon it, contents liquid.	Congested. Patches of yellow deposit in the neighbourhood of Peyer's glands, occasional desquammation, sometimes ulceration, contents fluid.	Inflamed, covered with effusion or abraded, sometimes ulcerated, contents fluid, fœtid.	Congested. Gall bladder full.	Friable, black, not enlarged.	Healthy.

inferred from the kind of re-action which ensues on their introduction into the body. Thus the poison causing "khorah" and cow-pox proper is in the great majority of cases mild, producing no sudden or striking nervous re-action, involving little or no change or vitiation of the functions of the body, stimulating little or no destructive tissue changes, interfering to a very slight extent with secretions, and quietly working out its own elimination through the channel which for an inscrutable reason it selects. The poison of "gootee" is reckoned to be more pernicious, because the re-action is more severe. The nervous system is primarily attacked, and general dulness, uneasiness, and shivering evidence the poisoning agency. The functions are gravely involved, tissue change of a destructive character is soon initiated; secretions become depraved, and the elemination of the poison from its seats of selection is accompanied by violent local action; inflammation in all cases, abration and ulceration in many, and erysipelatous gangrene in some.

In "puschima" and "rinderpest" we have the extreme of virulence. In these diseases the action on the nervous system is so pernicious that poisoning may ensue at once without the development of any other organic disturbance.

When these, however, ensue, their severity, their rapidity, and their fatality are most marked, and contrast strongly with the other diseases.

On comparing the diseases described under the names of "khorah," "gootee," "puschima," and "rinderpest" with each other, a remarkable sequence is disclosed, so much so, that from the mildest case of "khorah" without any constitutional symptoms and a very slight eruption up to the most severe case of "rinderpest," a continuous series of morbid phenomena seems to run; the whole forming a natural group or succession of diseases with "khorah" at one end and "rinderpest" at the other. On the borders of each we may find cases which it will be difficult to know where to place, but from the general run of cases in an epizootic, the character of the disease is declared. Thus we may find a case of "khorah" with severe constitutional symptoms, and general vesicular eruption which in an epizootic of "gootee" we should call by that name, or a case of "gootee" with the mouth and foot lesions peculiar to "khorah" which, unless the general run of cases were undoubtedly "gootee," we should call "khorah." In an epizootic of "gootee" we may find cases without any cutaneous eruption, and with the glandular enlargements characteristic of "puschima," and in the latter we may detect the typhoid or algide phenomena, the absence of glandular enlargements, and the presence of spasms.* As we ascend the series, the prominence of

* The history of a recent epizootic in Assam strongly confirms this view. In this epizootic cases presenting all the phenomena of puschima occurred. The symptoms of these are summarized by Dr. Imthurn as "numerous watery evacuations, prostration, death." Another describer of the same epizootic (Mr. Driberg) states that, in many cases, an eruption called bossunt breaks out on the body." He also, under the name of soboka, alludes to what is evidently foot and mouth disease. From Major Lamb's letter there is some presumption that puschima appeared at the commencement of the epizootic, and that subsequently "it assumed a quite different form," namely, gootee, XXXV." 1, 2, 3.

the skin eruption disappears, the severity of the diarrhœic phenomena increases. Glandular implications appear and then disappear, nervous phenomena become more marked and specific, putridity increases, the stages shorten, the type of fever degenerates, and the rate of mortality becomes greater.

There are also certain epizootics linking together the various diseases, epizootics which may be called by one or the other name. The best example of this is the Assam epizootic which stands half-way between gootee and puschima. A superficial account of this epizootic induced Dr. Palmer to place it in the same category as the "Calcutta epizootic," (1) yet a perusal of Dr. Long's careful observations will convince that it was gootee (2). It is difficult to say whether the epizootic in the Cossyah Hills, described by Lieutenant Colonel Hopkinson, (3) was khorah or gootee, and in other instances mention is made of epizootics with an intermediate mortality or occasional eruptions.

(1) X., p. 5.
(2) XXIX.
(3) XII.

This view is further strengthened by the history of eczema epizootica and vaccinia in England. The epizootic of 1839 of the former disease was more virulent and fatal than subsequent manifestations (4), and the epizootics of 1745 and 1770 of the latter disease were so malignant and fatal as to attract the attention of Parliament (5), though both diseases have recently been mild and comparatively harmless. Again, a very important observation is recorded by Dr. Aitken (6), as to ovine variola showing the unimportant nature of a cutaneous eruption as a pathognomonic feature. He says, "the virulent form" of ovine variola "never produces pustules." He describes the skin cracking in a zigzag manner, and in rinderpest cracks and sores of the skin are also observed (7).

(4) XXX., p. 84.
(5) XXXI., p. 267.
(6) XXXI., p. 272.
(7) X., p. 7.

A careful comparison of the symptoms and *post-mortem* appearances of the diseases in question, which have been summarized and stated without regard to any theory, will be found to speak strongly in favour of this view, which appears to be the most reasonable and probable under the circumstances. Still, as the degree of the symptoms is various, and the mortality of the diseases so different, *it is well that* they should be kept apart, at any rate as different varieties: they resemble each other more than any one of them resembles any other disease of man or other animals, but at the same time they present differences which have been recognized by unprofessional and unskilled observers sufficient to justify their being described and still remaining apart as different diseases.

Comparative Pathology.

I shall now under this heading proceed to compare the salient points of these diseases with others, in order, if possible, to determine their position in a scheme of comparative nosology, a subject which is as yet in its infancy.

Khorah and Cow-pox.—These diseases differ in the specific site of the eruption, in the specific nature of the eruption, in duration of the stages, and in the changes to which the eruption on the skin is subject. Even the general eruption on the skin is different in the time of its appearance and the sequence of its changes.

The two diseases are evidently different species of miasmatic epizootic diseases.

Gootee and Cow-pox.—The greater severity of the constitutional symptoms of the former, the difference of the dates of appearance of the stages, the difference of the kind of eruption and its changes, the presence of diarrhœa followed by dysentery in gootee and its absence in cow-pox, and the distinct character of the general eruption of the latter, separate these two diseases, whose only resemblance is the existence of an eruption and the presence of constitutional disturbance of a somewhat similar nature. They come under the same order, but are evidently different genera of disease.

(1) XXXI., p. 274. Dr. Aitken talks of *spurious* forms of cow-pox, whose nature he does not describe (1).

Gootee and Small-pox.—These diseases present remarkable analogies. The general course of the disease, the duration of the stages and of the diseases itself, the salivation, the discharge from the eyes, the occasional diarrhœa, the sore-throat, and the occasional involvement of the respiratory mucous tract, present a group of striking resemblances.

On the other hand, the character of the eruption is different, the secondary fever is not described in gootee, the latter disease is more "putrid," and the diarrhœa, which is succeeded by dysentery, more invariable. The diseases present strong analogies, but evidence is still wanting to establish their identity. None of the reports hint at the infection of man by gootee or the infection of animals by small-pox, nor even of the simultaneous prevalence of these diseases. Moreover, when cattle have been infected by human small-pox, the disease goes through the characteristic stages of cow-pox (2).—

(2) XXXI., p. 271.

Puschima and gootee and plague.

Between the forms of puschima and gootee in which there is glandular enlargement and plague there are many analogies. The circumstances of country and climate in which these diseases respectively flourish, are similar, *viz.*, deltas; low, crowded, badly ventilated dwellings; a moist warm atmosphere, the action of putrescent animal and vegetable matters, and insufficient and unwholesome food. (3) The season of year in which they respectively flourish (December to June) is the same. (4) The sequence and duration of stages are very nearly alike. The glandular lesions are very similar, only that in man the inguinal glands are more prone to be enlarged: the type of the fever, the rapidity of spread, the mortality, the state of the blood, are strongly analogous. In both there is a tendency to specific cutaneous lesions. Both may kill without the manifestation of any local lesion; both appear to be endemic diseases capable of becoming epidemic; both are considered highly infectious, and in plague as well as gootee and

(3) XXXIII., p. 328.
(4) XXXII., p. 371.

puschima, the characteristic secondary lesions may be suppressed, in other words, epidemics or epizootics which possess marked general similarities differ from each other in the kind and degree of local specific manifestations.

(1) XXXIII., p. 329. There is an interesting observation by Dr. Milroy (1) to the effect that an epidemic of plague in Bughazi was preceded for two or three years by a virulent epizootic among cattle.

There are important differences also, namely, the more hæmorrhagic character of plague, the diarrhœa and dysentery and puschima and gootee, which are not recorded of plague, the nature of the cutaneous lesion when it exists in plague most commonly carbuncular, and the enlargement of the heart, liver, and spleen, observed in plague. It is, however, to be noted that Dr. Long in Assam observed a very similar state of spleen to that recorded by writers on plague. The diseases are evidently closely allied, though they present specific differences.

Puschima and Gootee and acute Glanders.

The principal analogy between these diseases consists in the enlargement of the glands of the neck in each, and the discharge from the nostrils. They differ, however, materially in general course and symptoms, in the kind of cutaneous eruption and in the *post-mortem* appearances. They are evidently different genera of disease, though both exemplifying the general miasmatic type.

Puschima and Cholera Morbus.

The comparison here is between the more sudden, virulent, and algide forms of puschima without glandular enlargements (such as occurred in Ceylon, Calcutta, and Darjeeling), and cholera. The main points of resemblance are—

1*st.*—The liability to death following close on the first manifestation of symptoms.

2*nd.*—The algide phenomena.

3*rd.*—The profuse watery discharge.

4*th.*—The muscular spasms.

5*th.*—The co-existence of the two forms of disease in one locality; and—

6*th.*—To a certain extent the state of the blood and *post-mortem* appearances.

1*st.*—The algide stage of cholera precedes the febrile, while in puschima it is the reverse.

2*nd.*—The discharges in cholera appear before or consentaneously with constitutional symptoms, while in puschima constitutional symptoms precede the manifestation of any local action.

3*rd.*—Vomiting is an essential feature of cholera, not so of puschima.

4*th*.—Tenesmus is absent in cholera, but is described invariably in puschima; and—

5*th*.—Discharge of blood from the bowels is an invariable symptom of puschima, if the case is developed and the animal live long enough, not so of cholera. These are important differences, and militate against the opinion entertained and expressed by some that they are the same disease manifested through different channels (1).*

(1) XV.

Puschima and Typhoid Fever.

The resemblances are—

1*st*.—The character of the fever.

2*nd*.—The diarrhœa.

3*rd*.—The *post-mortem* lesions to a certain extent.

The differences are—

1*st*.—The duration of the whole disease and its stages.

2*nd*.—The skin eruption in typhoid and its absence in puschima.

3*rd*.—The dysentery in puschima, while it is only spurious in typhoid.

4*th*.—The specific intestinal lesion in typhoid involves primarily the solitary and agminated glands in a process of cell-growth followed by ulceration. Other intestinal lesions are secondary and non-essential, while the intestinal lesion in puschima is a general disease of the whole mucous membrane, of which any glandular phenomena are only a part.

5*th*.—The febrile phenomena in puschima are more evanescent than in typhoid.

These differences separate the diseases to a considerable distance.

Gootee and Distemper of Dogs.

These diseases present very many and striking resemblances. They are both infectious, miasmatic diseases, presenting similar stages of very similar duration. In both the fever is of a typhous character. In both the alimentary mucous membrane is mainly affected, and other mucous membranes secondarily, causing diarrhœa succeeded by dysentery. In both there is a skin disease, and individual symptoms, such as water running from eyes and nose, cough, &c., are remarkably alike. I have not been able to obtain a very exact description of distemper, but the analogies above noted, derived from a study of "Stonehenge's" chapter on the subject (2), are interesting and suggest further study.

(2) XXXIV., p. 614.

The foregoing sketches go to show that, while the diseases under consideration possess many striking resemblances to others when particular symptoms are considered, they are essentially *sui generis*, when a

* Mr. Cockburn, under the name of "Bhail," describes a disease which appears to be identical with cholera.

broad view of the whole detail and sequence of symptoms is taken, and resemble each other more than they resemble any other disease or group of diseases.

IX.—Diagnosis.

From the minute description, which has been given in Section VI of the symptoms of khorah, gootee, and puschima, there can be no difficulty in distinguishing them from each other and from other diseases. The eruptive nature of the disease, the description of eruption, and the sites which it selects are sufficiently characteristic of khorah to separate it from all other diseases of the foot causing lameness. As, on account of its epizootic and infectious nature, it is of importance to determine its nature, the cleft of the foot and inside of the lip should always be examined, and if *vesicles* are found in these sites, there can be no doubt of what the disease is. As khorah, for the purposes of treatment, must necessitate animals being laid up for some time and so involve considerable loss of work, it is of great importance to diagnose it correctly. If my surmise that the poison causing it is a milder manifestation of the same poison which causes gootee and puschima is well founded, then the importance of recognizing this disease, and using measures to check its progress, becomes still more pressing.

Every case of sore, swelled, or ulcerated foot is not necessarily khorah, and in diagnosing the disease from others, the manifest infectiousness, the eruptions and soreness of the mouth should be taken into consideration. Between severe cases of khorah, with well marked constitutional symptoms and general eruption, and cases of gootee, it will be difficult to distinguish. Lameness, the comparative severity of the general symptoms and mortality, will perhaps define the disease, but for practical purposes an exact diagnosis of such cases is not of such importance.

As there is a difficulty in diagnosing between individual cases of khorah and gootee, so there will often be a difficulty in distinguishing in some cases whether they are instances of gootee or puschima. The distinction is to be drawn more from the general peculiarity of the particular epizootic than from the symptoms presented by any one case.

The main differences between the two diseases are—

1*st*.—The presence of a skin eruption in gootee, and its absence in puschima.

2*nd*.—The lower type of fever, and greater tendency to prostration in puschima than in gootee.

3*rd*.—The earlier and more marked fœtor of the discharges in puschima than in gootee.

4*th*.—The shorter duration of the stages and of the whole disease, and earlier appearance of diarrhœa in puschima.

5*th*.—The more frequent occurrence of glandular swellings in the neck in puschima than in gootee.

6*th.*—The presence of spasmodic phenomena in puschima and their absence in Gootee; and

7*th.*—The higher mortality of puschima than gootee.

Between the severer form of puschima, as described by Mr. Rutherford, and rinderpest, there is very little difference, as will appear from a study of the table exhibiting their symptoms comparatively.

The spasmodic phenomena appear to be more severe and better marked in rinderpest, and the febrile symptoms are of a lower type and more evanescent in that disease.

X.—*Prognosis.*

In *khorah,* if proper care be taken and proper measures of treatment employed, the diagnosis is always good. (1) It is a mere local disease, requiring time and attention for its complete cure.

(1) XXII. XVIII., 1.

If any of the complications already enumerated are allowed to appear, the case becomes more likely to prove fatal.

If constitutional symptoms of any severity mark the epizootic, a certain proportion of deaths, not more than 25 per cent., may be looked for.

In *gootee* a large proportion of deaths must always be looked for. As to individual cases, the symptoms which would lead to an unfavorable prognosis are—

1*st.*—Low type of fever.

2*nd.*—Early prostration.

3*rd.*—Early fœtor of discharges and early diarrhœa.

4*th.*—Scanty or no eruption.

5*th.*—When ulcers exist, an unhealthy appearance of these.

6*th.*—Prolonged aversion to food and violent thirst.

7*th.*—Tight shrivelled skin.

8*th.*—Scanty and very red urine.

9*th.*—Early recumbency.

10*th.*—The occurrence of any complication.

In favorable cases the following presages may be noted:—

1*st.*—Mild fever of asthenic type.

2*nd.*—Relaxed skin and copious eruption.

3*rd.*—Clear discharges from eyes, nose, and mouth, void of fœtor or with a slight smell.

4*th.*—Bowels quiet.

5*th.*—Urine abundant and not of a very high color.

6*th.*—Return of appetite, of rumination, and slight thirst.

7*th.*—Healthy ulcers, if they exist.

8*th.*—Absence of complications. Of all these signs perhaps the most significant and that most usually noted is return of appetite and rumination.

In *puschima,* at the commencement of an epizootic, a mortality of at least 90 per cent. may be looked for, later it may diminish to 50 per cent. Each individual case should, however, obtain the benefit of treatment, and by pursuing the plan which experience and analogy suggest as the most likely to do good, by watching the case carefully and taking advantage of every favorable opportunity, many cows which would otherwise die may be saved.

The unfavorable signs in this disease are, early cold, fœtor, dysentery and recumbency. The earlier these occur the worse the case must look.

On the other hand, if the heat of the extremities and spine is sustained, if the fœtor is not great, nor the discharges in an evident state of decomposition, if the diarrhœa does not come on till the third day, and is not shortly followed up by dysentery, if the animal stands, is not compelled to lie down, then the case wears a more hopeful aspect.

Severe spasms, especially if they have any regularity or system, may also be looked on as bad signs, and their absence as good omens.

In Mr. Greenhill's cases, recorded by Dr. Palmer, (1) picking a little food and an improvement in the state of the bowels, were the earliest observed signs of recovery. The state and expression of the eyes and general appearance of the animal will also serve as indications of the nature and prospects of the case.

(1) X., p. 9.

XI.—*Treatment.*

This subject may be considered under three heads—

1*st.*—The avoidance of conditions which would render cattle more liable to be attacked by epizootics.

2*nd.*—The means which ought to be pursued to prevent the spread of epizootics when they appear in a locality or neighbourhood.

3*rd.*—The medicines and modes of medical treatment which should be applied in the several forms of disease under discussion.

1. In every epidemic and epizootic it is the poor, the diseased, the filthy, and the over-crowded which most early and most surely succumb to the influence.

At all times, then, cattle ought to be kept up to the greatest standard of health and comfort possible under the circumstances.

(*a.*) The quality of the stock should be sustained and improved—

I.—Avoiding breeding in and in, that is, allowing near relations to have sexual connection and to propagate the kind.

II.—Preventing too young bulls from covering.

III.—Obtaining bulls from a different locality and of a good stock.

IV.—Breeding should be adopted and encouraged as much as possible in preference to buying and selling, which greatly increases facilities for the spread of epizootic diseases.

(*b.*) Animals should not be set to work too soon, nor cows allowed to have calves too early.

(*c.*) Great care should be taken not to overwork cattle.*

(*d.*) They should not be crowded in small confined barees, and these ought to be dry, clean, and well ventilated.† The situation of cattle sheds should be carefully selected to avoid damp and malaria.

A raised bamboo machan covered with straw ought to be provided in *bheels* and damp places, when cattle are removed from the baree to plough or assist in gathering in.

(*e.*) When they get wet with water or perspiration they should be rubbed dry.

(*f.*) The food and drink must be carefully looked to.

Early rain grass, after the cattle have been used to dry food, is very injurious. Malarious pastures, coarse grasses, and old straw, are very injurious, and the muddy water of bheels and foul tanks should never be given as drink (1). Green grass, (except at the beginning of the rains) when it can be obtained, short dry pasturage, and wholesome hay and rice straw should be given as food.‡ The heart of the plantain tree or young plantain leaves chopped fine and small, boiled or broiled (2); gram and boossie, paddy or oil-cake, if they can be afforded, can also be given in small quantities as aids to other coarser fare. Good tank, river, or well water should be supplied for drink with the same regard to their quality as if they were intended for man.

(1) XXXVI., p. 3.

(2) VI.

2. When an epizootic threatens, cattle should be especially looked after. The greatest care should be taken not to permit the access of a diseased animal or of an animal from a diseased neighbourhood. The propriety of this caution is evident from the instances mentioned by the Magistrate of Backergunge already cited. Mr. Lambert, writing of the Ceylon epizootic, says, "the immunity" from disease prevailing in the neighbourhood "enjoyed upon this estate was attributed to the nature of the food, *to the absolute isolation in which the stock was kept*, and to the care bestowed upon them" (3). The feeding, housing, and general care, of the animals should be more solicitously looked to than ever.

(3) *See* also X., p. 12, to the same effect.

Cattle should be carefully kept away from roads and routes frequented by cattle travelling from one district to another.

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* And not to work them too long without food. Cattle are apt to injure themselves by surfeit when not fed at proper intervals.

† The sheds should be cleaned daily. The floor should be of dry-earth well pressed down (XXXVI., p. 2,) or still better, pucca, sloping on either side in order to allow water or urine to drain away. Dry grass or straw should be given for a litter.

‡ This should be chopped up and given with water. The addition of a little salt renders the mash more wholesome.

Buying and selling should be suspended or prohibited, and if any cattle are bought, they should be kept away from the others for at least twenty days.

Intercourse of all kind with affected villages should be as limited as possible, and if the disease come into the immediate neighbourhood, temporary hospitals should be constructed for sick cattle in out-of-the way places.

Inquiries should also be instituted as to the approach and direction of spread of the disease and means adopted to avoid it (1). There is reason to believe that if one diseased animal frequent a pasturage, it becomes a source of infection, and this should be held in mind.

(1) XXXVI., p. 27.

3. When the disease actually breaks out, the diseased animal should be separated from the healthy, and the latter removed to some locality where no disease exists, and if disease still appears, the process should be repeated until no more cases occur. (2) Mr. Caleb Ladd describes the measures which, at the suggestion of a Veterinary Surgeon, he adopted on the appearance of puschima on his farm. He removed all the diseased animals, burnt all the old straw and manure about the cow-house, all the straw in the house and the house itself. He then removed all the unattacked animals to a new house on the other side of his garden, and the plague was stayed. Mr. Ladd remarks that if these precautions, namely, removing all the stock as soon as one is attacked, and if the disease follows, removing to another place and burning the refuse of each place, were adopted in every instance, he thinks the disease would altogether disappear (3).

(2) XXIX.

(3) VIII., para. 7.

Mr. Sawer says, that the disease gootee appeared among a herd of forty-six of his buffaloes, of which two were attacked. He remarks: "I immediately detached these two and removed the entire herd from the locality; only one more case occurred" (4).*

(4) VIII., 2.

With these instances of success, in support of the propriety of this measure, it should invariably be resorted to.

In some places, indeed, it is invariably adopted (5), and its importance cannot be over-rated. Whenever, therefore, when an epizootic is known to rage in the neighbourhood of a locality, any cow is noticed to look ill and be off its feed, it should be at once removed, and the rest of the herd sent elsewhere.†

(5) XXXV., 3.

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* To these may be added two instances recorded by Veterinary Surgeon J. P. Gudgin, in Burmah. In one village after suffering severely from the disease, the inhabitants sent the remaining cattle to a jungle seventeen miles away, and the disease disappeared. In another case the plan adopted was that the sick were separated from the healthy, and the latter sent miles away into the jungles. After doing this the disease died out.

Another case is very interesting: "Swantay, no disease here. In anticipation of being attacked they had sent their buffaloes to a grazing ground beyond a range of hills about ten miles off." XXXVI., page 8.

† A yard's separation, as in some cases in Burmah, is not enough. The separation must be measured by miles, and it is well to split large herds up into smaller sections. (XXXVI. pp. 6, 7).

The Civil Surgeon of Backergunge recommends cattle sheds to be well cleaned out, and large smoking fires lighted daily for an hour or two (1). I am convinced, however, the safest plan is to burn the whole concern (2), and that in most cases involves very little loss. If the place is pucca, then it should be carefully cleaned and fumigated in the manner described, and not used again for three months at least (3). I shall here transcribe Dr. Palmer's excellent sanitary directions. He writes, "prompt and complete separation of the healthy from the affected or suspected cattle is to be enforced. * * * When it is practicable to remove the unaffected cattle, we believe this proceeding the more likely to be successful in checking the disease. * * * Straw, dung, hay, trough, and such like should be removed, burnt, and disinfected; the stall in which the animal stood should not be used again, but thoroughly cleansed out and disinfected * * * *All animals dying should be buried without a moment's delay, not skinned*, and no animals should be allowed to approach the burial ground until some time has elapsed since the last interment (4)."

(1) XIII., I.
(2) XXXVII., p. 2.
(3) X., p. 4.
(4) X., p. 12.

This last direction is of the utmost importance. When we consider that the animal body, diseased or dead, contains material sufficient, under favoring circumstances, to infect many others, the greatest possible care in neutralising and removing this source of disease is imperative. All traffic in hides should be carefully abstained from.

Dr. Palmer recommends the use of McDougall's disinfecting powder, but in its absence quicklime may be employed, not as a mere cover for impurities, but as an agent that may destroy any organic residue which may have escaped careful cleansing.

The question of *inoculation* has still to be decided by experiment, though at present presumptions are rather against than for it.

As the diseases are quite dfferent from cow-pox, notwithstanding Professor Symond's opinion, as to their ariolous nature, vaccination would, in gootee and puschima, in all probability, be perfectly useless. This has been determined in England by experiment.

The only question is whether, if the cattle of this country generally were inoculated with the contents of the vesicles of gootee or the salivary discharge, tears, or serum of the blood of puschima, a saving of stock would be effected on the whole.

Two indisputable facts are in favor of this measure—

1st.—That an inoculable disease poison when admitted into the body through the skin does not produce such a severe sequence of symptoms as when absorbed by mucous membranes.

2nd.—That a modified form of disease can be obtained by successive inoculations from animal to animal.

This has been extensively demonstrated by experiment, and the experience of vaccination from man to man confirms the truth of the statement (5).

(5) XXXIII., p. 506.

The subject is now under investigation and experiment in Europe. Inoculation has been practised on a large scale with the rinderpest poison in the steppes of Russia "its home," with the result, that only a trifling percentage of cases have died, and the animal subjected to the process, though exposed to every source of infection, have not again contracted the disease.

Beyond the steppes results have not been so favorable, and it has been found necessary to subject 13 to 15 animals to inoculations successively ere the virulence of the poison was sufficiently reduced, and the rate of mortality brought down to a small percentage (1); in other words, in the technical language of inoculators, "in other races of cattle the virus must pass through 13 to 15 generations before inoculatory matter that produces a mild form of disease is obtained."

(1) XXXVI., p. 16.

If the operation is to be tried in this country the following precautions are indispensable :—

1. The proceedings must be under the control and strict supervision of a professional man.

2. They ought to be conducted apart from where healthy cattle might be infected.

3. The virus must be primarily obtained from a mild case of the disease gootee or puschima.

4. A sufficient number of animals must be successively inoculated until the symptoms become mild.

5. When the requisite degree of modification has been reached, cautious trials should be made at first on a limited scale.

6. Goats and sheep should also be subjected to inoculation, with a hope that mitigation of the virulence of the poison may be more rapidly and completely accomplished by that means.

These proceedings cannot obviously be left to private zeal or interest. To carry them out thoroughly and properly demands an expenditure and resources which no private individual can command.

The losses occasioned yearly by cattle diseases have become a matter of imperial solicitude and interest. A successful solution of the propriety and power of inoculation can only be accomplished by direct imperial action.

The end to be attained is at the cost of a trifling mortality of one or two per cent. to protect all the cattle of the country, against a disease that carries off 80 to 90 per cent. wherever it appears. Evidence from many quarters tends to show that virulent epizootic visitations are becoming more and more frequent, and that often agriculture, which is the very life of the country, is paralysed by these outbreaks.

The time has come when the matter must be looked full in the face. I am convinced that mere written directions are as unavailing in this matter as in the matter of human vaccination, and that a comparison of the cost of yearly losses by cattle disease, and the cost of a well devised set of experiments to test the question of the practicability and protective power of inoculation, and perhaps eventually

of machinery to apply, throughout the country, this protective power, will show a balance in favor of the latter. The subject is a highly important one in many respects, and appears to be gradually forcing itself more and more into such a position that something *must* be *done*.

In dismissing this subject, I would enter a strong caution against the fancied resemblance between gootee and cow-pox, inducing any one to attempt inoculating man with the matter of the gootee vesicle, a proceeding which caused the death of the individual experimented on.

3. The medicinal treatment will be more instructively given under the head of each disease separately.

(*a.*) *Khorah.*—In mild cases the treatment is almost purely local. The simplest treatment recommended and employed for this disease is keeping the animal standing for several days in soft mud (1). This is said to be a very efficacious mode of treatment, and is that generally employed by the natives. It has the advantage of effectually warding off flies, the source of one of the worst and most fatal complications, and so tends to limit the mortality. If this method is employed it must be carried out carefully and completely.

(1) VI. XV., XVIII., 1. XXII. XXIII. XXXV., 3.

If the mouth becomes sore the best application is—

Alum	...	..	...	1 ounce.
Water	...	...	...	1 quart.

To be applied with a sponge or cloth thrice a day.

The foregoing may be called the *wet cure*. It is principally employed in, if not peculiar to, India, elsewhere, *dry method* are pursued.

The feet are well washed. The animal is kept carefully from moisture, and tar, kurrunj oil (2), camphor and oil (3), (as much camphor as will dissolve in hot oil) sulphate of copper two ounces, treacle (goor) eight ounces, (to be heated till the substance assumes a red color,) &c., applied.

(2) XV., 1.
(3) XXII.

If constitutional symptoms are severe, a saline purge should be administered, such as—

Epsom salts	...	...	...	8 ounces.
Common salt	...	...	...	8 ,,
Ginger	...	...	...	2 ,,
Water	...	...	...	1 quart.

If febrile symptoms continue, the following may be given—

Black antimony	...	...	...	2 drachms.
Black salt	...	...	...	3 ,,
Nitre	...	...	...	2 ,,
Water	...	...	...	1 pint.

To be given twice a day (4).
Complications require special treatment.

(4) XIII., p. 1.

1. Ulcers on the mouth or udder are to be treated with the alum lotion already given, or sprinkled over with desiccated alum (alum pulverised by heat which drives off some of the water in combination with it). This is best done by holding it over a flame in a spoon or similar receptacle.

2. Ulceration of the foot and destruction of the horny matter is best treated by scrupulous cleanliness, paring off shreds of horn, poulticing and the application of the sulphate of copper in substance, if the ulcer is foul and fungating, or in liniment according to the formula already noted. If the ulcer is deep and unhealthy-looking, strong nitric acid should be applied with lint, followed by poultice and lotion of sulphate of zinc (five grains to the ounce), or sulphate of copper (10 grains to the ounce) : neem or indigo water may be used in this stage. To ulcers of the mouth a lotion of nitrate of silver (grains ii. iv. to one ounce) is a good application.

3. The development of maggots is better prevented by the use of the means already indicated than cured. If they do appear they should be carefully extracted. Yellow wash (corrosive sublimate four grains to one ounce of lime water) should be applied till the ulcer becomes healthy, and then some of the weaker astringent lotions. Scrupulous cleanliness and the careful protection of the ulcerated surfaces by cloths and bandages are necessary. Corrosive sublimate may be applied as a powder well diluted with flower or chalk. Diet in this disease should be simple and nutritious.

Gootee.—In treating this disease general remedies are of primary importance, and local remedies secondary; the latter will be very much the same as those indicated under khorah according to the symptoms presented. When I add that sponging the surface over frequently with warm water, or warm vinegar and water, during the second stage will materially assist the development of the eruption and the cure of the disease, I have said all that is necessary on this head.

Two special modes of treatment which have been confidently recommended in this disease first demand attention. The earliest is that of Mr. Piddington (1), who recommends separating the dull cattle from the healthy on the appearance of an epizootic, and subjecting both separately to the vapor of muriatic acid. He describes the process thus :—" In a stable containing 30 or 40 head of cattle, a plate full of warm salt is placed upon a few hot embers in an earthenware dish. Over this is poured about an ounce of concentrated sulphuric acid. A thick white smoke, which is highly pungent and suffocating, instantly arises, and the operator must carefully avoid breathing this, for it may occasion spitting of blood or even disease of the lungs. He should quit the stable immediately, shutting the door close. The windows, &c., must have been closed beforehand, the cattle will take refuge at the end of the stable and much coughing will be heard amongst them. The stable may be kept closed for eight or ten minutes or even more if there is not much coughing heard. This process is repeated in the evening and so on for three or four successive days.

(1) XXVI.

This measure, he asserts, has constantly stopped the disease among his cattle. It is simple, inexpensive, and should certainly be put in practice when a suitable place can be found.

The other special method of treatment is that recommended by Captain Chambers, Assistant Commissary General at Dinapore (1), who states that, according to his experience, the black salt (karee neemuck or lobun) of the bazar is an "infallible specific in this disease." The dose to be employed is one ounce (half chittack) twice a day in cases of the disease, and when the disease breaks out in a flock, he advises one-fourth to half an ounce to be given daily to all the cattle as a preventive. He says, that when fairly tried he has never found this remedy fail, and adduces a striking instance communicated to him by a planter who had lost forty bullocks of a herd of eighty, and after commencing to employ the karee neemuck did not lose another animal. He also states the addition of tartar emetic (sixty grains to one ounce of karee neemuck) improves its action. This mode of treatment should certainly be tried and its efficacy put rigidly to the test of experiment.* The foregoing methods are probably equally applicable in gootee and puschima, and may be tried in both. It is not clear from the papers referred to in what form of disease they were found useful, and it still remains to determine their exact value and place. There is an almost utter want of experience on this subject, and any plan offering a fair chance of success should be put in practice without hesitation, either until it is found wanting or another better method suggested or demonstrated.

(1) VII., 7.

The treatment which has been recommended most commonly, perhaps on the ground of analogy and probability, is the following :—

(*a.*) Saline purges in the first stage.

(*b.*) Saline diaphoretics and diuretics in the second stage.

(*c.*) Astringents, tonics, carminatives, and stimulants, in the third stage.

(*d.*) Easily digested and nutritious food throughout the disease.

(*a.*) As a saline purge, the formula already given under khorah, may be used, or common salt to the amount of 1 ℔. to 2 ℔s. may be given, or still better—

Epsom salts	...	...	...	8 ounces.
Sulphur	...	...	...	4 ,,
Powdered ginger	...	...	...	1 ounce.

Water, beer, gruel, or rice water, one quart to make a drench.

Saline purgatives are principally used in order to produce a copious and complete evacuation. This in the early stages of the disease may clear away the poison, or render the body, by having its excretory channels stimulated, more capable of voiding the morbid material from the

* Here I ought to place the plan adopted by Dr. Jackson, of Balasore, successfully in four cases, namely, the application of croton seeds to the sides in order to excite profuse suppuration.—XI., 2.

circulation. There is reason to believe, however, that saline purgatives act principally on the lower bowels, and if there is any cause for suspecting that the first or third stomachs are over distended with food, or to apprehend the caking of aliment in the latter, one or other of the following doses should be administered, the latter by preference.

Boiling water	...	...	16 ounces.
Aloes	...	...	2 ,,
Carbonate of Soda	...	...	2 ,,

Dissolve.

To ten ounces of this add ten ounces of Epsom salts, and administer with beer or gruel.

Linseed oil	...	...	1 pint.
Croton ,,	...	...	10 drops.
Oil of turpentine	...	...	2 ounces.

Mix.

These should be given slowly, especially the latter, as when so administered it finds its way to the third stomach without entering the rumen or paunch.

(*b.*) During the second stage the following may be given :—

Antimony	...	...	1 drachm.
Nitrate of potash	...	...	4 drachms.
Black salt	...	...	4 ,,
Sulphur	...	...	1 ounce.
Beer, gruel, or rice water	...	...	1 quart.

to make a drench, which is to be given twice a day.

Sulphur determines to the skin and bowels, and in this disease fulfils the indications of nature.

(*c.*) In the third stage, camphor should be largely employed as a good stimulant, opium and bhang as a good sedative and astringent, gentian or cherretta as a good tonic, and ammonia, ginger, carraway, or pepper, as stimulants.

The following formulæ will be found useful :—

Camphor	...	...	1 ounce.
Bhang	...	...	4 ounces.
Carbonate of ammonia	...	...	4 drachms.
Brandy or spirit	...	...	1 pint.
Gruel, beer, &c., to	...	...	1 quart.

A drench.

To be repeated twice or thrice a day (1).

(1) X., p. 11.

Camphor	...	...	2 drachms.
Gentian	...	...	2 ,,
Opium	...	...	1 drachm.
In gruel	...	...	1 quart.

A drench, to be given twice a day, or

Camphor	...	...	2 drachms.
Cherretta	...	...	1 ounce.
Powdered ginger or pepper	...	...	2 ounces.
In gruel, &c.	...	...	1 quart.

A drench, to be given twice a day.

Similar formulæ may be devised according to the symptoms presented or the means at disposal.

If a more decided astringent is indicated or desired, any of the following formulæ, given by Dr. Bensley of Backergunge, will be found useful :—

Decoction of Indurjub made by boiling eight ounces of the seed in 24 ounces of water for half an hour	...	...	...	4 ounces.
Chalk	...	...	...	½ ounce.
Opium	...	...	...	1 drachm.

Mix and give this as one dose.

Repeat every two or three hours according to purging.

Decoction of unripe bael, eight ounces of the fruit to twenty-four ounces of water		...	4 ounces.
Catechu	...	...	4 drachms.
Opium	...	...	1 drachm.

To be given every two hours till purging is brought under control.

Gum	...	...	...	2 ounces.
Sulphate of copper	...	...	...	2 drachms.
Water	...	...	...	oun ces.

Boil for half an hour, add opium one drachm, and repeat every three hours if necessary.

(*d.*) During the whole course of the disease nutritive drenches should be frequently administered, oatmeal gruel, rice water, arrowroot

(1) XVI. 2 and water, "fulka" root with thin rice gruel (1), boossie and water, suttoo and water, or any of these with whey, &c., and when the cow shows any inclination to eat, the finest grass, thoroughly cleaned, should be given.*

Mr. Grote, the President of the Agricultural and Horticultural Society, writes :—The result of my observations this year was to expect recovery if the patient could be supported with liquid food during

(2) XIII. the crisis of this disease—"gootee" (2).

The complications of the disease are treated on general principles, always keeping in mind the serious and depressing nature of the main disease, and dealing more largely in stimulants than in the simple disease.

1*st.*—There is always more or less bronchitis, which, according as it is limited to the wind-pipe or extends into its sub-divisions, is a less or more severe event. The most important remedial agent is counter-irritation or vesication along the wind-pipe; this can be best produced by one of the following :—

Oil of turpentine	...	...	Equal parts.
Liquor ammonia	...	...	
Olive oil	...	...	

To be rubbed in along the course of the trachœa.

* Care must be taken not to allow the animal to satisfy its urgent thirst too copiously, otherwise death is accelerated (VI.)

Croton seeds	...	...	1 ounce.
Oil of turpentine	...	...	12 ounces.

Steep for a fortnight and then pour off the clear liquor. It can be used

(1) XXX., p. 9. similarly to the last dose, or diluted with half the quantity of olive oil (1). If the inflammation extend to the lungs those applications should be rubbed freely over the chest.

At the same time the following may be given—

Sweet spirits of nitre	...	...	4 ounces.
Powdered opium	...	...	2 drachms.
Powder of ipecacuanha	...	...	1 drachm.

One ounce to be given for a dose twice a day in warm gruel.

If the lung disease assume the form of pneumonia then counter-irritation over the site of pain and abnormal physical signs should be decidedly employed. The best agent for that purpose is the last of the two formulæ above given, with a proportion of one part of croton seeds to eight of turpentine instead of one to twelve.

2. Ulcers will be treated on the same principles as in khorah. Scrupulous cleanliness, exclusion of flies, and if they present symptoms of weakness or delayed healing, solution of sulphate of zinc, sulphate of copper, &c., are the main points.

3. The state of "fardel bound" is best met by the judicious employment of purgatives at the commencement of the disease. If it is indicated later in the disease, the purgative, and especially an oily one, administered as directed should be repeated.

4. Tympanitis is treated, if slight, by an oily purge, linseed or castor oil, followed by strong carminatives, such as carraway, assafœtida, ginger, &c., with opium or bhang and ammonia. A good remedy is one-fourth of a pound of mustard given in a quart of warm water.

If the case is severe, tapping the stomach or the introduction of a tube into it by mouth should be at once resorted to.

During convalescence, particular care should be given to the diet, which must be nutritious and digestible, at the same time a surfeit must be carefully guarded against.

Tonics as sulphate of iron (two to four drachms) and gentian or cherretta should be given occasionally.

Puschima.—After having gone in such detail in the treatment of gootee, little remains to be added as to the treatment of puschima, which must be based on the same system. The more depressing nature and rapid course of the disease should be borne in mind, and nutrients and stimulants are more clearly indicated. These with counter-irritants to the right side, chest, throat, and spine, constitute the essence of the treatment.

Oil of turpentine	...	...	6 ounces.
Croton oil	...	...	1 ounce.
Liquor of ammonia	...	...	1 „

is a quick and effective counter-irritant.

If the throat symptoms are severe, counter-irritation should be especially applied all round the larynx, and a solution of nitrate of silver (one scruple to an ounce) should be applied to the root of the tongue and fauces.

In the third stage camphor should be used largely, with a small addition of opium, assafœtida, and capsicum.

Chlorate of potash and common salt might be dissolved in the drenches given for food as antiseptics.

In this as in the last disease the great object of all treatment must be—

First, to support the animal's strength in order to enable it to pass through the inevitable stages of the disease; and *secondly*, to meet special symptoms or complications which may threaten to cut life short during its progress.

NOTE.

Since completing the above, I have been fortunate enough to obtain the elaborate and excellent report of the Royal Commission appointed to investigate the cattle plague in England. I might with advantage introduce many of the interesting observations on this disease made by such men as Drs. Sanderson, Murchison, Marcet, Beale, &c., at the instance of the Commission, into the text; but I think it better to let it stand as an independent record of the disease, as observed in India, drawn entirely from Indian source of information. At the same time it will be valuable for purposes of comparison to cite shortly, under the principal heads, some of the conclusions arrived at by the painstaking inquiry of the Commission.

Symptoms and pathology of the disease.—Under this head I shall give Dr. Murchison's summary.

1. "The cattle plague now (2nd January 1866) prevalent in Britain is the same disease as the *rinderpest* of German writers.

2. "The chief symptoms of the disease are fever with general depression, an aphthous condition of the interior of the mouth and nostrils, an eruption composed of roseolar patches, scabs, and sometimes pustules and petechiæ on the skin, running from the eyes, nostrils, and mouth, suppression of milk, constipation followed by diarrhœa, albuminuria and hæmaturia (bloody urine), and the ultimate development of a condition similar to the 'typhoid state' of human maladies.

3. "The chief morbid conditions found after death are the eruptions on the skin, and in the interior of the mouth catarrhal or croupal inflammation, and even gangrene, of the mucous membranes, ecchymoses, an unusully dark colour of the blood, a peculiar odour, and great proneness to decomposition.

4. "There is no resemblance whatever between cattle plague and the typhoid or enteric fever of man in their anatomical lesions, their clinical history, or their etiology. All arguments derived from the supposed identity of these two maladies are therefore baseless.

5. "Cattle plague is equally distinct from human typhus, scarlet fever, erysipelas, influenza, or dysentery.

6. "Cattle plague belongs unquestionably to the same class of diseases as the human exanthœmata, such as variola, scarlatina, and rubeola.

7. "Small-pox is the human malady which it most closely resembles; this resemblance holds good not merely, to a great extent, in the cutaneous eruptions of the two diseases, but in their symptoms and anatomical lesions, and in their extreme contagiousness and capability of propagation by inoculation.

8. "The resemblance between rinderpest and variola is sufficiently striking to demand immediate inquiry, whether vaccination or an attack of ordinary cow-pox confers future immunity from rinderpest, or modifies its course. The result of such an experimental inquiry can alone determine the identity or non-identity of the two diseases; but, if the reply to the inquiry be in the affirmative, a certain method of arresting the spread of the cattle plague will be placed in our hands."

A supplement to this summary adds, "the obvious inference" from some experiments is "that, notwithstanding the close analogies between the cattle plague and human small-pox, the former disease like the so-called small-pox of sheep is uninfluenced by ordinary vaccinia, and like it therefore, is in all probability a distinct species of disease from human small-pox." (Third Report, Appendix, p. 79).

The foregoing is extremely interesting as showing—

1. That the cattle plague of England resembles our "gootee" even more closely than it does "puschima." This is still more clearly brought out by the detailed report in which the analogy (identity?) is pointedly discussed.

2. That the analogies between this and human diseases pointed out at pp. 23, 24, and 25 of the text are amply confirmed, more particularly the non-identity of cattle plague and typhoid fever, and the strong similarity of the former and small-pox. Dr. Murchison says:—"The changes which take place in peyer's patches are obviously the result of the general intense inflammation of the mucous membrane. There are no sub-mucous deposits, and none of the lesions running through definite stages to ulceration which I am familiar with in the typhoid or enteric fever of man." An opinion exactly identical with that which I was led to from a study of the Indian cattle plague.

3. It will be remarked that, in the descriptions of rinderpest, from which I drew the condensed account given in the text, a cutaneous eruption is not described. This must have been owing to either superficial examination or accidental omission; for Dr. Sanderson,

who specially investigated the symptoms of cattle disease, not only himself describes an eruption in the form of thickened patches of epidermis, excoriations, papules, *crusts, pustules,* and tubercles, but quotes a long array of continental pathologists to the same effect. A skin eruption is then an essential feature of rinderpest, and its absence exceptional, and puschima, if it is really void of a cutaneous eruption, which I doubt, is in that particular different from rinderpest,—a remarkable fact quite opposed to the opinion hitherto held on the subject in this country on high authority.

4. The spasmodic phenomena mentioned in the preceding pages, though not specified by Dr. Murchison, are described by numerous authorities.

5. The swellings of the neck recorded in so many accounts of gootee and puschima appear to be peculiar to this country, as they are not mentioned by any other authority which I have consulted.

Infectiousness.

"We adhere then to the opinion we formerly expressed, that the true mode of preventing the spread of the cattle plague is to treat it as an entirely contagious disease. We believe this expresses the whole truth; but if it be not so, if some other conditions of which we know nothing favour or restrict its spread, this does not remove our obligation to act on what is ascertained with certainty." (Third Report, p. 8).

Inoculation and Vaccination.

"The substitution of a mild for a fatal disease, as of cow-pox for human small-pox, has naturally been hoped for in cattle plague. It will be seen in the Report of Dr. Sanderson, and appears also from experiments tried at the Royal Veterinary College, that the vaccine virus, whether taken direct from cows, or after passing through the human body, has no effect on cattle plague, and that human small-pox and the virus of the small-pox of sheep (variola ovina) have likewise no influence. The virus of cattle plague, after transmission through the bodies of sheep and goats, returned into the body of an ox, is found to have lost none of its intensity. Repeated transmission of the virus through cattle weakens its power, but in no very sensible degree. At present the vehicle of the poison, whether it be blood, serum or mucous discharge, appears also to influence its action little if at all, while mere dilution has no effect whatever. In fact, all attempts either to weaken the power of the cattle plague poison, or to find another agent which might make the system of the ox insusceptible to it, have entirely failed." (Third Report, p. 9).

Treatment.

"But, although as respects the value of drugs, the evidence is merely negative, this is not the case as to diet. The information obtained by the Edinburgh Cattle Plague Committee shows that, by judicious feeding with soft mashes of digestible food, the proportion of recoveries has been considerably, and in some places very largely, increased.

This is consistent with the pathology of the disease. * * * It does not appear that any advantage is to be obtained by giving large quantities of stimulants. * * * We must close this section of our Report with the admission that in this as in other countries no drug has been found which can be recommended as either an antidote or a palliative." (Third Report, p. 14).

From C. BERNARD, ESQ., *Secretary to the Chief Commissioner, Central Provinces, to the Secretary to the Government of India, Home Department,—(No.* 397/25, *dated Nagpore, the 6th of February* 1868.)

As called for in your letter No. 245 of the 17th ultimo, I am desired by the Chief Commissioner to forward herewith a printed copy of the only papers in this office on the subject of cattle disease, being a report by Veterinary Surgeon Quallett, specially deputed for the purpose, and by Mr. Hutchinson, Chief Inspector of Post Offices, Central Provinces, on the epizootic which prevailed among the mail horses on the postal line between Nagpore and Jubbulpore during parts of the years 1866 and 1867. The papers will also be found printed as a supplement to the *Gazette of India* of the 30th March 1867.

2. Incidental notices of disease having attacked the agricultural cattle of the country have appeared in occasional annual district reports; but the subject has never been scientifically examined, or has never been of such magnitude as to demand enquiry on the part of this Administration.

From H. B. RIDDELL, ESQ., *Director General of the Post Office of India, to Secretary to Government of India, Home Department,—(No.* 3706, *dated 5th March,* 1867).

In continuation of my letter No. 3351, dated 8th February 1867, I have the honor to submit in original a letter* from the Secretary to the Chief Commissioner of the Central Provinces, forwarding a copy of the report of Mr. Veterinary Surgeon Quallet and Mr. Hutchinson upon the epizootic which has, for the last two years, attacked the mail horses on the Mirzapore and Nagpore and Khundwa and Agra roads.

* No. 608—55, dated 22nd February. To be returned.

2. I request the sanction of Government to the payment to Mr. Quallet of the deputation allowance recommended by the Chief Commissioner, and would also suggest that the reports or extracts from them should be published.

From C. BERNARD, ESQ., *Secretary to the Chief Commissioner of the Central Provinces, to Director General of the Post Office of India,—(No. 608—55, dated Nagpore, 22nd February* 1867).

With reference to your predecessor's letter marginally noted, I am directed to forward copy of a report signed by Mr. C. Hutchinson and Veterinary Surgeon Quallet, regarding the disease which has recently carried off so many horses on the mail line between Nagpore and Jubbulpore.

No. 2382 of the 30th November 1866.

2. Mr. Quallet appears to have done his best to ascertain and verify all the facts regarding, and symptoms of, the disease. Though the epidemic had abated before he arrived, yet opportunities were still available of testing the character of the symptoms. It seems to be quite clear that the disease is an epizootic of somewhat the same character as cholera. It has its origin in the air breathed, or the water drunk, by the animals attacked. It is highly contagious, but spreads rather through the breath, or through the air tainted by the fæces of the diseased animals than by touch.

3. The enquiry has established a high degree of probability, if not a certainty, that the disease was first contracted by animals drinking the water of the jungle streams and rivers which run by their stages. Even where well water is available, it may sometimes be similarly tainted, if the well from which it comes is situated in the bed or basin of such streams. The Chief Commissioner is disposed to accept this deduction of the Committee regarding the malarious effect of the water of jungle streams, because in other parts of these provinces such water has been found to cause very fatal forms of fever, and even cholera itself, to attack the people who drunk it during certain seasons of the year.

4. The Chief Commissioner is disposed to think that, in the rainy season, the consumption by mail horses of new rank grass may be one of the causes of the diseases. Dried grass, indeed, is stacked at every stage; and, as far as may be, the horses are fed upon it during the wet months. But still, unless the supervision be very strict, the supplies of this dry grass run short, and rank and wet herbage is given to the horses.

5. What the Committee say regarding the hard work which made the mail horses more prone to the disease, and less able to resist its attacks, is doubtless true. The work of mail horses is necessarily hard on a road where high speeds are maintained, and the gradients are occasionally heavy. But the work was not too hard when the full number of horses were in working order at each stage. When, however, some fell ill or died, the work became doubly hard on the survivors,—for the mails must be carried, and new horses could not be brought on or near the line of road. In this way heavy work may have contributed to make the disease more fatal.

6. Although no real or sufficient cure for the disease was discovered, yet it is satisfactory to learn that the local postal authorities did all they could, and indeed did much to mitigate its severity. The stages were moved from one spot to another, diseased horses were separated, stables were fumigated, and different modes of treatment were adopted. The Veterinary Surgeon's testimony to the excellence of the food, and the cleanliness of the stables, provided for the mail horses, is very creditable to the postal department.

7. The practical recommendations which the Chief Commissioner would press on your attention, after considering this report, are—

I.—That the stages be so re-arranged as to leave no stages near any of the streams or rivers where the disease has been most violent.

II.—That at every stage where there is no water but river water a well be sunk at a sufficient distance from the river bed. The horses' attendants should then be compelled to water their horses, and even wash them with well water. If your department should have difficulty in sinking wells in the manner proposed, the Chief Commissioner can arrange for having the work done by the public works officers stationed on the northern road. But, in this case, early intimation should be given of the places at which wells are needed, in order that the work may be completed before the rainy season sets in.

8. I am to add that, as the services of Veterinary Surgeon Quallet were obtained by the Chief Commissioner, it seems necessary for this Administration to recommend such special remuneration as may be fit in Mr. Quallet's behalf. That officer has done his work well; and drawn up, with Mr. Hutchinson's help, a good and useful report. He will, before he returns to Agra, have travelled about a thousand miles of mail road, and made enquiries at more than a hundred stages. A deputation of Rs. 150 a month for the period of his absence, together with all *bonâ fide* travelling expenses, should, I am to recommend, be granted to him.

9. With reference to the final paragraph of Mr. Quallet's report, in which he remarks that he had no opportunity of treating diseased animals, and so discovering what treatment would be best for this particular disease,—a disease which, during a long veterinary experience, Mr. Quallet has never before seen,—I am to make a further suggestion. In case the disease should re-appear during the coming hot weather, or during the rainy season, Mr. Quallet might hold himself in readiness at Allahabad to visit the mail line again, so soon as the disease re-visits the mail horses. If this were arranged, the Chief Commissioner would take care that early intimation should be given to Mr. Quallet, in the event of his services being required.

Report of enquiry held by Messrs. Quallet *and* Hutchinson *into the Horse Disease of* 1866 *between Jubbulpore and Nagpore.*

Mr. Quallet having arrived from Allahabad, we commenced our investigation at Jubbulpore on the 23rd January 1867. We divided our enquiries into four general heads, sub-dividing these again, as the subject required. The following are the four divisions:—

1st.—The disease itself.
2ndly.—Its origin.
3rdly.—Its effects.
4thly.—Its remedy, meaning thereby what has been and what might be done to check it.

Firstly, then, our primary enquiries were directed towards the disease itself, and we tried to make ourselves thoroughly acquainted with it in the following way:—

1st.—By ascertaining from a number of credible and intelligent witnesses, the chief distinguishing symptoms.

2ndly.—By ascertaining these symptoms ourselves from personal examination of living horses attacked; and—

3rdly.—By endeavouring, by dissection of the bodies of animals dying from the epizootic, to discover any abnormal appearance of structure, and, if possible, the cause of death. We accordingly examined a great number of men living at the stables, embracing actual owners of stages, their mooktears, and the most intelligent men among the Bargeers. We found that the disease appeared under two distinct sets of symptoms, *viz.*, those termed by Natives "fever," and those called "fixed jaw." We merely give the Native names. Whether these are two diseases, or merely the same disease under different appearances and symptoms, we are unable to decide. From the fact of the same horse never having the two diseases, or from the symptoms of both combined being never in one case, one would be inclined to imagine they are different diseases. But again the circumstance of the diseases appearing in one stable at the same time, one horse being attacked with "fixed jaw," and another with "fever," and from the fact that, in a certain locality, "fever" is more prevalent than "fixed jaw," the no one locality is free from both descriptions, makes us inclined to think they both may be merely the same disease attacking different organs, and thereby producing different symptoms and phases.

The witnesses we examined, one and all agree in describing "fever" as follows:—From perfect health the horse suddenly appears dull and off his feed. A swelling appears under the chest at the girthing place, which extends to the sheath, and down the hind legs, this swelling being apparently painless. The coat stares, and the belly is tucked up. The horse stales frequently, and in large quantities, passing a colorless urine; the body, ears, legs, and breath are very hot,—this extreme staling being a fatal sign. As the disease advances, the horse entirely refuses food, and soon dies in a state of great emaciation. Some horses live up to the fifteenth day; but the greater number die on the fifth and

sixth. Some cases have been known in which the horses died on the first day after the attack, and great many died on the second and third.

The symptoms of the other disease, called "fixed jaw," are these:—At first there is a little flow of saliva from the mouth, and a small sore is seen under the tongue, which is covered with minute reddish granular specks. As the disease advances, these turn into ulcers of various sizes, up to that of a rupee, and a most fœtid smell emanates from the mouth. The sores spread over the whole tongue, which is swollen and hard, lining membranes of the mouth, and extends to the back of the throat, which becomes also swollen. The horse will not open his mouth, perhaps cannot, as it requires considerable force to separate the jaws. This symptom has most probably led to the native name.

From the utter impossibility of administering medicines at an advanced stage of the disease, and from the fact that the horse does not eat or drink anything from very shortly after his being attacked, we are inclined to think the pharynx may be constricted, and swallowing rendered impossible. The ulcers change from a yellowish to a green, and finally to a blueish tinge; the change being accompanied by an increased discharge of fœtid glary saliva, and the smell from the mouth more and more overpowering. In many cases the closing scene is marked by violent purging, and the horse dies apparently from exhaustion and mortification of parts attacked. The disinclination of the horse to open his mouth, and the closing of the pharynx, and the swelling of the throat, render it impossible to administer medicine; the Natives are, consequently, to a great extent, powerless, and unable to do anything to save the horse, or to mitigate his sufferings. Such are the symptoms of the disease as gathered from hearsay.

We extended our enquiry by personally examining living horses affected with the disease. We had an opportunity of doing so at these stables, namely, Mugui, Hinota, Nulla, and Bungaree; at each place there was a horse suffering from "fixed jaw." All these had been attacked but the day before we saw them, and we recognized at once the truthfulness of the symptoms detailed above; and we feel that our examination cannot add any further information to what we heard from the Natives. We did not feel justified in killing these animals in order to dissect them, as Mr. Quallet thought there might be a chance for them of recovery. We accordingly prescribed a topical application, and some medicine to be administered, as the power of swallowing was not as yet gone. However, as soon as we found a horse dying from "fever," at Mr. Quallet's suggestion, he was shot, having previously obtained the consent of the owner, and Mr. Quallet at once proceeded to make a *post mortem* examination.

On the abdomen being opened, we were struck by the remarkable pallor and blanched appearance of the intestines. We had observed this appearance in the external mucous membranes before death. The liver was small, and of a black greenish color, easily broken down by the finger. The stomach was perfectly empty, and the bowels distended

with large quantities of fœcal matter in a state of fermentation, with a peculiar fœtid smell. The kidneys were white and flabby, and much enlarged. The bladder perfectly empty, and the spleen greatly increased in size. On cutting through the diaphragm into the chest the lungs appeared to be healthy but blanched. The heart very much enlarged, but firm in substance. We opened the larynx and trachœa, the pharynx and œsophagus, and found these apparently healthy.

At Koraee we found a horse struggling on the ground, and on enquiry ascertained it had been ill with "fever" for five days, being in perfect health and at work before. Mr. Quallet immediately examined him, and pronounced him dying: and, with the consent of owner, the horse was shot and opened. We noticed the same blanched appearance in the intestines and in the mouth and nostrils prior to death. The liver was of the same black greenish color as in the former case. The spleen of natural size; bladder greatly distended with urine. The bowels filled with large quantities of fœcal matter in a state of fermentation. Stomach perfectly empty; kidneys white and flacid. The heart was very much enlarged with soft flacid walls, and when thrown on the ground fell flat, instead of maintaining its natural, round, firm character. Underneath its serous envelope there was an infiltration, as it were of yellowish, jelly-like fluid. The muscles throughout the body were unusually white in color. The alimentary canal and trachœa were apparently healthy, as well as the lungs, with the exception of marked general pallor.

Having completed our enquiries into the disease itself, our attention was next directed to discover, if possible, its origin, and our researches were made with a view to ascertain—

1st.—At what time of the year it generally appears in its most virulent from.

2ndly.—Whether any peculiar class of horses, thereby meaning old mail horses, or new ones recently employed, were more liable to attack than others.

3rdly.—Whether the disease is known in the districts from whence the horses came.

4thly.—Whether the disease is known among other than mail horses.

5thly.—Whether there may be any thing in the stables likely to cause the disease.

6thly.—Whether there may be any thing in the air, water, grass, or gram, likely to produce these effects.

7thly.—Whether any one locality is more fatal than another.

We find the disease first commences, and is most virulent, in July and August, in fact during the heaviest rains, and progresses into the autumn, and gradually lessens as the year dies out.

2ndly.—That it spares no horse, whether an old stager, or one recently brought into use.

3rdly.—We were unable to gain any information whether the breeding districts suffer, as the majority of mail horses come from such far distances, and from so many different parts of the country,—there being an extreme scarcity of such horses in the Central Provinces, few, if any, being bred there.

4thly.—We found that the horses of villagers, brunjaes, and zemindars, suffer in like manner, and we believe that Mr. Egerton, the Commissioner, had his horses attacked in the Mundla district, a long way from the infection of mail stables: and that Mr. Heymen, Executive Engineer at Seonee, has likewise lost a horse; and we heard that a detachment of cavalry lately passing this road had lost one, if not more, from the same disease.

5thly.—We are unable to trace any cause of disease in the stables. They are all newly built, are very clean, airy, and well lime washed. They have constantly been changed about from one site to another, as the disease attacked horses therein. We noticed no accumulation of dung or offensive matter, and were struck with the general clean and airy appearance of all. The nosebags, harness, and various stable appendages were minutely examined, and we found them clean, no sour smell about the nosebags, or anything likely to cause disease. With exception of Doomah, there is no stable within a village.

6thly.—We carefully examined the gram, and found it remarkably good, sweet, and fresh. The grass, which was stacked at each stable, was likewise very good, and in large quantities, having no unpleasant smell or appearance of mould. The water at most stables was procured from wells; and at those where river or nullah water was used at this time of the year it is sweet and fresh, perhaps it may be less so towards the close of the hot weather: and it is a remarkable coincidence that at these stables, where nullah or river water is used, the disease has been most rife.

In absence of the requisite scientific instruments we were unable to make any examination of the air, though we were desirous of doing so.

7thly.—We found that the most fatal locality is between Chupra and the Neiludda, embracing the stables of Amba Nullah, Koiah Nulla, Morai, Goorda Nulla, Sheer Nuddie, and Doonnah, Bungaree, Hoolkie, Hinowta Nullah, and Migree.

We strongly incline to the feeling that the drinking of nullah water may have some effect on the horses, because the disease is worst at the stables where the horses drink such water. At all the stables above mentioned, with names ending with nullah, the disease is most virulent. Another reason that also guides us to suspect nullah water is, that, until 1865, the stables were only five miles apart; but in that year were removed to six miles, and may thus have come upon these nullahs.

We will next notice the effects of the disease, meaning thereby the mortality among mail horses only. We have but little to say on this head. No less than 512 horses have died of this epizootic in 1866; and we append a list of these, showing the deaths at each stable, from which will be seen that our investigation and consequent remarks on the virulent period are corroborated as well as those regarding the most fatal localities.

We will now remark on the remedy, or whathas been done departmentally to check the disease. The Chief Inspector issued an order, lithographed in Oordoo, Mahratti, and Nagree, to every stable, and to every overseer to the following effect:—He first described the symptoms by which the disease might be recognized; and presuming it was either infectious or contagious he went on to direct the isolation of the animal attacked with all its belongings. He ordered the floor of the stable to be dug up and cast away, a new put down, well lapoed and the interior of the stable to be thoroughly lime-washed, and then to be well fumigated with sulphur, the animal attacked being also subjected to the fumes of sulphur. He subsequently issued a second vernacular paper, giving details of a remedy that had proved successful in one case; copies of both are hereto attached. The Nagpore stable was attacked, and the Chief Inspector personally treated the five last cases. Out of ten horses, seven were attacked, of which five died. The first was treated by local astringent applications, but without success. In the second case depletive remedies were tried to subdue the great inflammation, likewise unsuccessfully. The third case was treated with stimulants, without avail,—attention being paid in all three instances to the production of healthy action in the bowels and bladder.

The fourth and fifth cases were treated entirely by sulphur fumigation; and, whether the force of the disease had spent itself or not, these two recovered. The stable was lime-washed, floor dug up and thrown away, new one put down, the whole well lapoed, and the building again fumigated with sulphur. There has been no case since. The contractors were informed that unless these remedies, simple in themselves, were tried, their claims for compensation would not be considered. We think it right to express our opinion that, though not entirely checked, the virulence of the disease has been mitigated by the precautions above detailed, and that the continued fumigation with sulphur has tended greatly to ward off attacks.

In reviewing the facts that this investigation has disclosed, we are of opinion that the disease is the effects of a poison taken into the system, either by inhalation, or with food or water. And that in some horses it acts more severely on some particular organs, producing the symptoms described above as "fever," or on other organs causing the disease termed by natives "fixed jaw." We think that the poison is capable of being re-produced from infected horses, and carried atmospherically to others, thereby infecting them. We are not prepared to state whether the disease is conveyed by direct contact or not.

We do not think the disease is produced from any carelessness on the part of the horse owners in not keeping the stables clean, or by their giving the horses bad and unwholesome food; but we admit that

the disease is more fatal to mail horses from hard work and exposure and the absence of scientific medical treatment. It has been most fatal in 1866; and the comparative great number of deaths, and consequent loss to owners, is attributable to the larger number of horses employed in that year than in 1865, ten horses being the number at each stage employed in 1866 to five in 1865. The high mortality may likewise be attributed to hard work weakening the horse, and thereby pre-disposing him more to this disease; and, when attacked, less able to stand up against it. For although ten horses at each stage may be quite sufficient to carry on the daily work, yet, if two of this number die from disease, the remaining eight must do the work of ten, until the two new horses are supplied; and we find it is extremely difficult to procure horses quickly in these parts. We also think that the speed required of mail horses renders them more liable, than any other class of horse, to disease.

We are of opinion that the horses should be supplied with fresh well water at every stage in place of the nullah water they are obliged to drink at many stables where no wells exist. Towards the close of the hot season nullah water is stagnant, and must be unwholesome; and the very fact that the greatest mortality has been among horses supplied with such water, tends very strongly to couple the disease with water.

We find that sulphur fumigation has been of much use in mitigating the severity of the disease, and we recommend that its periodical use be compulsory in all stables, whether infected or not.

In concluding these remarks, we regret the fewness of the facts, and meagreness of the information we have been able to collect, the disease having all but died out, and there being but very few cases throughout the line. We are inclined to think that, had the investigation been held during the height of the epizootic, assisted, as this has been, by an experienced Veterinary Surgeon, who would have watched and treated every phase of the disorder, our information would have been fuller; and the real cause, and, perhaps a remedy, might have been discovered.

J. QUALLET,
Veterinary Surgeon, Royal Artillery.

C. W. HUTCHINSON,
Chief Inspector, Central Provinces.

NAGPORE;
The 30th January, 1867.

From A. H. Harington, Esq., *Junior Secretary to Chief Commissioner of Oudh, to the Secretary to the Government of India, Home Department,—(No. 290, dated the 18th January 1868).*

In compliance with the request contained in your letter No. 140, dated 11th instant, I have the honor, by desire of the Chief Commissioner, to forward, in original, the papers marginally noted, regarding cattle disease in the Hurdui District, and to request that they may be returned when no longer required.

From Commissioner, Seetapore, No. 4136, dated 12th November, with enclosures.			
To Commissioner, Seetapore, No. 4024, dated 21st idem.			
From	„	„	No. 4173, dated 18th „
To	„	„	No. 4125, dated 25th „
From	„	„	No. 4280, dated 25th „
From	„	„	No. 4290, dated 26th „
Circular No. 115-4215, dated 2nd December 1867.			

Office Memo. by T. Devine, *for Officiating Commissioner, to the Secretary to the Chief Commissioner of Oudh,—(No. 4136, dated the 12th November 1867).*

Submits copy of Deputy Commissioner, Hurdui's No. 1826, dated 6th instant, and recommends that an application be made to the military authorities for the services of a Veterinary Surgeon, in view to his being employed in enquiring into the nature of this disease, and in discovering, if possible, a cure for it.

The disease appears to be causing very serious loss, and its ravages are, the Officiating Commissioner fears, not likely to be confined to one district.

From J. R. Reid, Esq., *Offg. Deputy Commissioner, Hurdui, to the Commissioner, Seetapore Division,—(No. 1826, dated the 6th November 1867).*

I have to bring to your notice that there is at present raging in this district a fatal cattle disease. The disease appears in two forms. In one form the animals affected first show signs of disease by ceasing to eat; they soon after pass bloody fœces, and die within some hours of the first appearance of the disease. In the other form, the progress of the disease is slower, and is attended with the appearance of sores in the mouth and throat. In these sores maggots quickly appear. In this form also bloody fœces appear. The former type of disease has not been, as far as I have learned, successfully treated, but the majority of cases are reported to end fatally. I have called the attention of the Civil Surgeon to the disease, and will submit the result of his examination.

2. The disease has appeared in many villages throughout the district. In Hurdui itself it has not appeared. But in villages, about hundreds of cattle are reported to have died within the last ten days. Similar reports have been received from Shahabad, Bilgram, and Sundeela. The people of uninfected villages are themselves taking precautions to prevent cattle of infected villages from coming near

their cattle. I have issued proclamations on the subject, and, in the case of places where there are cattle pounds and the disease has not yet appeared, have ordered that cattle be not impounded, or strange cattle brought near the pound. I have likewise intimated the occurrence of the disease to the district officers of neighbouring districts, that they may take what precautions they think fit to keep cattle from this district from passing into their own.

3. Only cattle proper and buffaloes have been affected as yet no disease has appeared among horses, sheep, or goats.

4. The disease causing so much loss, coming after the late excessive rains and the cholera, will create much distress among the agricultural classes.

Memo. from the Officiating Secretary to the Chief Commissioner of Oudh, to the Commissioner of Seetapore,—(No. 4024, dated the 21st November 1867).

Acknowledges receipt of his No. 4136, dated 12th instant, reporting the above, and, in reply, states that every possible effort should be made to isolate diseased animals and prevent all communication, as this is the only security, the Chief Commissioner believes, against the spread of the disease; requests he will again report on the subject, and warn other Deputy Commissioners, so that they may be prepared to take immediate similar measures.

From A. G. Walker, Esq., *Asstt. Commissioner, for Offg. Deputy Commissioner, Hurdui, to the Commissioner of the Seetapore Division,—(No. 1866, dated the 14th November 1867).*

In continuation of this office letter No. 1826, dated 6th instant, I have the honor to submit copy of a memorandum by the medical officer regarding the disease among cattle prevailing in some parts of this district. Unfortunately, Dr. McReddie has not been able to get more than two bodies for dissection in villages near Hurdui, and consequently he does not speak with much certainty.

2. The number of cattle reported to be dying in some villages was so great, that I thought there was some ground for fearing that a contagion had broken out, the nature or result of which might be similar to those of the European cattle plague, and for this reason I brought the matter to your notice. I am glad to forward the medical officer's report that the malady is not contagious in the same way as the cattle plague was, and that it is probably a kind of fever.

3. I have had some further inquiries made in the neighbourhood of Hurdui. The disease has been found to exist in 15 villages out of about 100 villages visited. These villages are chiefly to the southward in the direction of Bilgram; some of them, however, lie to the west of Hurdui. The mortality has varied in these villages from 8 or 10 per cent. to 50 per cent. In company with Dr. McReddie, I, two or three days ago, visited a village seven miles from Hurdui on the

Shahabad Road, where, from the number of skeletons lying at a little distance from the village, it was evident that, at the least, 100 head of cattle had died within the previous 15 or 20 days. The number of cattle in the village had been probably about 300. There were only one or two sick cattle in the village, and the disease seemed to be dying out.

4. Further enquiries have been ordered through the tehsildars. Anything of interest on the subject that comes to notice will be communicated.

Memorandum on Cattle Disease Epidemic in the Hurdui District, dated the 13th November 1867.

Since the beginning of October, or probably later, disease amongst cattle has been epidemic in some parts of the district. As the result of inquiries made regarding it, the following remarks are offered:—

The *symptoms* which seem to characterize it are at first languor, ceasing to graze or feed, followed by diarrhœa, with stools of dark brownish color, passed very frequently, but apparently without pain; at a later stage the animal loses all inclination to move, and sits down as if quite exhausted.

With the progress of the disease, blood is also passed in stools; the blood is distinct from the fœces and seems to be passed subsequent to the latter, indicating the seat of hemorrhage to be the lower bowel; unfortunately, I am not able to verify the statement as to the source of the blood from dissections. I have examined only two bodies; in these I could discover no ulcerations in the lower bowel, or indeed elsewhere, to account for the blood; but congestion of the bowels without ulceration is sufficient to account for the symptom. I ought to mention that blood is passed only in drops, and not to any great extent. With regard to the *post mortem* appearances of the disease, I must express myself with much diffidence, and a much larger number of dissections are required before committing myself to any decided opinion on the *nature* of the disease. Thirst is not a constant symptom, according to statement made to me: in some cattle said to be urgent, in others absent. Perhaps the discrepancy might be explained by taking into consideration the stages of the disease. Thirst being urgent at first, but latterly, when the poor beast becomes quite indifferent to its own sufferings, it does not seem to require drink. In some animals I have observed maggots in the gum, tongue, and lips. This appearance is by no means constant. It indicates an advanced stage of the disease. The presence of maggots points to the fact of the previous existence of bruises or sores in which flies have deposited their ova,—the sores themselves being due to extreme debility.

The *duration* of the disease seems to last from 3 to 15 days. Recoveries are frequent if the symptoms are protracted beyond a fortnight. *Mortality* is large. It is impossible to say what proportion of those attacked die; but the disease, when attacking a village, carries off from 25 to 50 per cent. of the cattle. As might have been expected, hardy animals, like buffaloes, have died in a much smaller proportion than oxen.

As to whether the disease is *contagious* or not, I believe it may safely be said not to be contagious to the same extent as the *rinderpest*, *i. e.*, diseased cattle *grazing* with healthy ones do not impart the disease, but diseased and healthy daily *tied* and *fed together*, the latter take the contagion; thus a house which has had one death amongst its cattle is certain of having more die, or at least take the disease. This points to the necessity of separating sound from unhealthy animals.

The *causes* of the epidemic are not easy to trace. The late heavy rains and the general unhealthiness of the season might, to a certain extent, account for it, but *malarious* influences do not appear to me to have originated it. In some instances, villages situated on the edges of jheels have escaped; while others situated on high, well-drained soil, have suffered. Much fever does not prevail, nor has prevailed, amongst the rural population around the civil station, or at all events not to an extent to be regarded as epidemic, or to give rise to great mortality. It consequently argues that malaria has not produced the cattle disease; an influence acting on cattle would certainly act on the much more susceptible human frame. It is a well-known fact that cattle in the district get no salt owing to the high price of the article, and from the prohibition to use the "kharee" or Oudh salt. I believe the want of salt accounts, to a great extent, for the disease, *with other causes* combined. Until further information is obtained on the subject, perhaps it would not be unsafe to designate the disease as a form of "remittent fever."

G. D. McREDDIE,
Civil Surgeon.

Memo. from MAJOR J. REID, *Officiating Commissioner, Seetapore Division, to the Deputy Commissioner, Hurdui,—(Dated the 18th November 1867).*

Outbreak of Cattle disease in Hurdui District.

In reply to No. 1866, dated 14th instant, requests him to take immediate measures for having animals attacked with the disease immediately removed to a distance and kept entirely separate from healthy animals. The Officiating Deputy Commissioner will observe that Dr. McReddie considers the disease contagious, though not so virulently contagious, as the cattle plague in Europe. *Vide* also demi-official of this date.

Memo. by MAJOR J. REID, *Officiating Commissioner, Seetapore Division,—(No. 4173, dated Seetapore, the 18th November 1867).*

Copy of the foregoing forwarded to the Secretary to Chief Commissioner for information, in continuation of this office No. 4136, dated 13th instant.

Memo. from the Officiating Secretary to the Chief Commissioner of Oudh, to the Commissioner of Seetapore,—(No. 4125, dated the 25th November 1867).

In reply to his letter of the 18th instant, requests that he will adopt all measures on the assumption that the disease is virulently contagious. The Chief Commissioner is strongly of opinion that this is the only safe plan to go upon; if the assumption be incorrect it can do no possible harm, while the result of erroneously supposing the disease to be non-contagious may be ruinous.

From MAJOR J. REID, *Officiating Commissioner of the Seetapore Division, to the Secretary to the Chief Commissioner of Oudh,—(No. 4280, dated the 25th November 1867).*

In continuation of No. 4173, dated 18th instant, forwards, for information, copy of a demi-official memorandum from the Deputy Commissioner of Hurdui on the above subject.

Copy of a demi-official Communication from Deputy Commissioner, Hurdui, to the address of the Commissioner of the Seetapore Division.

When the cattle disease came to my notice, I issued proclamations and instructed tehseeldars and thannahdars to order zemindars and chowkeedars to inform and cause the people to keep diseased and sound cattle apart, and to prevent cattle of villages, where the disease had appeared, mixing with the cattle of villages where there is no disease. The disease, however, seems on the decline. I found it to exist, or have existed, in four or five villages on the Hurdui side of Tundiaon, and in one village I saw the skeletons of 50 cattle or so that had latlely died, and five or six cattle sick; there I gave personal directions. On the other side of Tundiaon, and all along the Goomtee, I find no trace of the disease anywhere. The tehseeldar of Sundeela has come to meet me here, and I learn from him that it is passing away. I find, too, from his statement, that the disease has not been nearly so bad in villages on the Sundeela side of the district, as in those on the Hurdui Tehseel that I have written about. I have called for (to be made up from the reports of Chowkeedars) returns as to the number of villages where the disease has been, or does exist, and the number of cattle that have died. The disease was reported to be bad in the Bilgram direction. I have no very late news of that part of the district, but will send them to you on receiving them. The Shahabad Tehseeldar reported yesterday that it is passing away in his part of the district.

The disease is not spreading. I was afraid, at first, that it might be a contagious epidemic, and the mortality in some villages was so great that it seemed very serious.

I will write to you again whenever it seems necessary.

From W. GLYNN, ESQ., *Deputy Commissioner, Kheree, Lukheempore, to the Commissioner, Seetapore Division,—(No. 2801, dated the 22nd November 1867).*

In reply to No. 4171, dated 18th instant, states that, previous to the receipt of Commissioner's letter under reply, reports were called for from tehseeldars on information regarding the disease being received from the Deputy Commissioner, Hurdui, and that the tehseeldars and district superintendent, Oudh Police (who was also referred to), replied that no disease had made its appearance in this district.

Memo. by MAJOR J. REID, *Officiating Commissioner of Khyrabad,—(No. 4290, dated the 26th November 1867.)*

Copy of the foregoing forwarded to the Secretary to Chief Commissioner for information.

Circular—By J. F. MACANDREW, ESQ., *Officiating Secretary to the Chief Commissioner, Oudh,—(No. 115-4215, dated Lucknow, the 2nd December 1867.)*

The Chief Commissioner is pleased to publish the following memorandum by Dr. McReddie, the Civil Surgeon of Hurdui, upon an epidemic among the cattle in that district, which has recently been raging, and has not even yet disappeared.

2. The action which has been followed in Hurdui has been to presume that the disease is highly contagious, and to separate diseased from healthy animals as much as possible, to isolate the former, and to permit no communication with them. Treatment can, of course, be resorted to according to the best light at the disposal of the Deputy Commissioner in such a case, but the Chief Commissioner desires that, in all cases, separation and isolation of the diseased animals should be resorted to.

3. It may be mentioned that a disease showing similar symptoms became epidemic in the early part of this year in Fyzabad before the rains, which seems to confirm Dr. McReddie's opinion that the unusual fall of rain had nothing to do with it. Similar measures of separation and isolation of the diseased animals stamped out the disease there.

4. In conclusion, the Chief Commissioner desires that, when any epidemic breaks out in a district, either among men or beasts, an immediate report be made by the Deputy Commissioner direct to this office, to the Commissioner of the division, and to the Deputy Commissioners of the districts bordering upon his own; and if the district is conterminous with the North-Western Provinces, to the Collectors of the districts adjoining under that Government.

From R. SIMSON, ESQ., *Secretary to the Government of the North-Western Provinces, to the Secretary to the Government of India, Home Department,—(No. 150, dated Allahabad, the 4th February* 1868).

As requested in the letter from your office, No. 244, dated 17th ultimo, I am directed to forward the accompanying copy of the corespondence noted in the margin, on the subject of the cattle disease in the North-Western Provinces.

Extract para. 92, from the report of the Sudder Board of Revenue on the Revenue Administration for the year 1861-62.
Proceedings of the Madras Government, dated 27th October 1863.
Letter from this office No. 1375 A., to the address of the Secretary to the Government of Madras, dated 3rd December 1863.
Letter from this office No. 1376 A., dated 3rd December 1863, to the address of the Board of Revenue.
Docket from the Secretary to the Board of Revenue, No. 249, dated 20th April 1864, with enclosures.
Letter No. 428, dated 28th June 1864, from the Secretary to the Board of Revenue, North-Western Provinces.
To ditto ditto No, 832 A., dated 21st July 1864.

Extract para. 92 *from the Report by the Sudder Board of Revenue on the Revenue Administration, North-Western Provinces, for the year* 1861-62.

92. Mr. Daniell writes as follows regarding a distemper which caused great loss among the cattle of the Jhansie District:—

"There was a great loss of cattle last rains in the pergunnahs "east of the Betwa from a kind of cow-pox which attacked the tongue. "The disease the Natives called *muta*, but from what I heard of its "character the cattle appear to have died as much from inability to take "food as from the disease. This complaint was highly infectious, and "in some villages almost all the cattle are said to have been carried off "before precautions were taken against its spreading by separating "those attacked from the rest.

"Simultaneously with this there broke out a complaint which "attacked cattle in the feet, and caused the hoof to slough away. I "believe this disease is not attributable to damp, but to some internal "cause; nor, as far as I know, were any means found to remedy it."

[*For Proceedings of the Madras Government, Revenue Department, dated 27th October* 1863, *see pages* 1 *to* 3.]

From R. SIMSON, ESQ., *Secretary to the Government of the North-Western Provinces, to the Secretary to the Government of Fort St. George,—(No.* 1375 A, *dated Camp Tilhur, the* 3rd *December* 1863.)

I am directed to acknowledge the receipt of your letter No. 1934, dated 27th October last, forwarding copy of papers relative to a cattle disease prevailing in Kurnool, and enquiring whether any such disease has ever prevailed in these provinces, and if so, what measures have been taken to check its progress.

2. In reply, I am desired to state that a disease similar to the one now prevalent in the Madras Presidency appeared in the Jhansie Division in 1861-62, but no particularly successful treatment was apparently discovered for it. Further enquiry will, however, be made on this point, and the result communicated hereafter.

From R. SIMSON, ESQ., *Secretary to the Government of the North-Western Provinces, to Officiating Secretary, Sudder Board of Revenue, North-Western Provinces, (No.* 1376 A, *dated Camp Tilhur, the* 3rd *December* 1863).

In forwarding the accompanying copy of the papers* received from the Madras Government, on the subject of a cattle disease now prevailing in that Presidency, I am directed to request you to address the Commissioner of Jhansie, in whose Division a similar disease prevailed in 1861-62, and any other officer within whose jurisdiction the distemper may have appeared, and desire them to supply if possible at an early date, the information required by the Government, Fort St George.

* No. 1934, dated 27th October, and enclosure.

2. Dr Pearson, I am to remark, has been separately addressed.

From G. H. M. BATTEN, ESQ., *Secretary to the Sudder Board of Revenue, North-Western Provinces, to the Secretary to the Government of the North-Western Provinces,—(No.* 249, *dated the* 20*th April* 1864.)

Submits copy of the Report of the Superintendent of Dehra Doon, and a copy of Commissioner's reply thereto, with the Board's suggestion that the correspondence might be printed in Selections of Government Records.

From R. MANDERSON, ESQ., *Superintendent of Dehra Doon, to* F. WILLIAMS, ESQ., *Commissioner of the* 1st *Division,—(No.* 53, *dated the* 9*th March* 1864.)

In reply to your No. 14, dated 22nd January, I have the honor to state that there appear to be two epidemic diseases which occasionally attack cattle in this district, one called the "burra rog" (great disease), the other called "rora"; they are both, as far as I can ascertain, infectious.

2. The "burra rog," which in many respects bears an analogy to the murrain described in the papers circulated by the Madras Government, is by far the more fatal of the two.

3. It commences with disinclination for food, but insatiable thirst attacks the animal affected; then follows drooping of the ears, discharge from the mouth, general lassitude, shivering, cold, sweats, hair

standing on end, and other similar symptoms of approaching disturbance of the entire system. Then commences violent purging, the evacuations being first of a green color, and eventually bloody, until death intervenes.

4. During the disease pustules appear on the body of the size of a pice, but they are not raw, nor does the hair of the animal fall off. The urine is scanty and of a high color. The animal ordinarily dies within two or three days after purging commences. Sometimes it survives to the eighth and tenth days. The stronger and better in condition the animal is, the sooner it succumbs to the disease, and a greater proportion of weak, ill-conditioned animals recover than of the reverse.

5. The remedies employed appear to be useless. The most popular appear to be chupatties made of "oord attah" and mustard oil (surson) plentifully interspersed with charms and incantations.

6. This disease appeared in the Doon and Jounsar Bowur in 1862.

7. The other epidemic common in this part of the country is called "rora."

8. It commences with the general symptoms which attend the "burra rog," followed by a thin discharge from the nose and swelling in the mouth and throat, a sore then appears in the cleft of the hoof, and occasionally sores appear on the body not attended by any discharge. The cause of death is ordinarily the sores in the mouth and tongue which prevent the animal from taking food.

9. This disease is by no means necessarily fatal, and the zemindars themselves allow that, if properly cared for, the animal attacked will often recover. It generally appears in the rainy and hot seasons, and not often or with great virulence in the cold. The remedies employed consist of deodar oil, assafœtida, lime, leaves of peach trees, and mustard oil.

10. It is epidemic in its character, and when its force has been exhausted, leaves the village in which it originally appeared to visit another. It is considered to be contagious.

11. With regard to both these diseases there appears to be an impression that they have become more aggravated in their nature and more frequent in their occurrence of late years. I have no means of testing the truth of this supposition—but it is undoubtedly the prevalent impression that such is the case, and it is attributed by the people to the greater massing of cattle together of late years (owing to increased population in Dehra and its vicinity) than was the custom formerly.

12. Their practice at least agrees with their theory, for at the commencing of either epidemic they drive their cattle as far into the jungles as possible.

13. I may mention that in the same year, 1862, a disease similar in its character to the "burra rog" broke out among the elephants in Dehra and was very fatal; several died, and the one attached to my office was only recovered with the utmost care and attention, but she has never recovered the shock nor regained her original condition up to the present day.

14. The natives speak of the "burra rog" among animals as analogous to cholera among the human race, and possibly the remedies which succeeded in one year might be unavailing in the next; but there can be little doubt that the remedies employed by Dr. Bidie would generally be useful in these murrains, as the ingredients of his treatment are cordial and tend to check the prostrating effects of the disease, and I would therefore beg to suggest, with reference to your letter No. 24, dated 23rd ultimo, that printed abstracts of the disease, its symptoms, and treatment, be supplied to every district officer in English, Hindee, and Oordoo, for distribution to the zemindars.

From F. Williams, Esq., *Commissioner of the Meerut Division, to* R. Manderson, Esq., *Superintendent of Dehra Doon,—(No. 40, dated the 14th March 1864).*

Referring to your letter No. 53, dated the 9th instant, reporting on the diseases of cattle, I have the honor to state that I am not aware that the diseases prevail outside the Doon.

2. I will readily sanction the cost of printing a good translation of the symptoms and Dr. Bidie's remedies, so that every village in the Doon and Jounsar may have at least one copy.

From Major B. P. Lloyd, *Commissioner of the Jhansie Division, to* G. H. M. Batten, Esq., *Secretary to the Sudder Board of Revenue, North-Western Provinces,—(No. 557, dated the 1st March 1864).*

In compliance with your office endorsement, dated the 16th December last, No. 343, I have the honor to submit the following report on the subject of the cattle disease which prevailed in the Jhansie Division during 1861-62.

2. Notwithstanding the virulent nature of the disease which carried away a large number of cattle in the three districts of this division, and the various descriptions of treatment resorted to by the natives, they failed to discover any remedy; and the only means of preventing infection was found in the separation of the diseased animal from the rest.

3. The malady called by the natives, "matha" (small pox) is stated to have assailed the tongues of the animals, who refused to take food, and died from starvation.

4. The true cause of the distemper cannot be ascertained. Major Davidson, Deputy Commissioner, Jhansie, believes from the fact of the disease having raged in his district, during the monsoons, that it is induced by damp.

5. The Deputy Commissioner of Lullutpoor, Captain Tyler, reports that, within the last two years, a new description of disease has attacked the cattle in the district, which has been found to be very destructive in its effects. Its symptoms first show themselves in a slight cough for three or four days, when the throat begins to swell and becomes painful to the touch, the animal labors much in breathing, its nostrils commence to dilate enormously, and an offensive matter flows therefrom. The natives are at a loss for a remedy, and only separate the infected cattle from the flock as a precautionary measure against the spread of the contagion.

From G. H. M. BATTEN, ESQ., *Secretary to the Sudder Board of Revenue, North-Western Provinces, to the Secretary to the Government of the North-Western Provinces,—(No. 428, dated Allahabad, the 28th June 1864).*

Adverting to paragraph 3 of the Orders of Government in the Revenue Department, No. 534, dated 16th ultimo, and in continuation of my letter No. 366, dated the 3rd instant, I am directed by the Sudder Board of Revenue to state, for the information of the Hon'ble the Lieutenant-Governor, that correspondence regarding the remedies employed for the cattle murrain will be found printed at pages 35 to 38 of the Supplement to the *Gazette of India*, dated 10th February 1864. Dr. Bidie's letter on the same subject is in that correspondence.

From J. D. SANDFORD, ESQ., *Under-Secretary to the Government of the North-Western Provinces, to the Secretary to the Sudder Board of Revenue, North-Western Provinces,—(No. 832 A., dated 21st July 1864).*

I am directed to acknowledge the receipt of your letter No. 428, dated 28th ultimo, referring to the supplement to the *Gazette of India*, dated 10th February last, as containing the correspondence regarding the remedies employed for cattle murrain.

2. In reply I am desired to state, for the information of the Sudder Board of Revenue, with reference to the suggestion contained in your docket No. 249, dated 20th April last, that there is nothing in the papers submitted by the Board, which seems to the Lieutenant-Governor worth printing in the Selections of Government Records, especially as a much more elaborate account of the disease and of its remedies has appeared in the *Gazette of India*.

3. His Honor thinks that it might be advisable to circulate the papers, printed in the *Gazette of India*, to the officers of those districts where the disease has appeared, with instructions to make known their contents to tehseeldars and zemindars.

4. The Board are accordingly requested to cause a reprint to be made of the necessary papers from the Supplement to the *Gazette of India* of the 10th February, which should be circulated with a translation, as directed in the preceding paragraph.

From R. SIMSON, ESQ., *Secretary to the Government of the North-Western Provinces, to the Secretary to the Government of India, Home Department,—(No. 301 A, dated 14th July* 1868.

> Letter No. 77, dated 5th ultimo, and enclosure, from Commissioner of Allahabad.
> Letter No. 24, dated 20th ultimo, and enclosure, from Commissioner of Allahabad.

In continuation of the letter from this Department, No. 150, dated 4th February last, I am directed to forward the accompanying copy of the papers noted in the margin, on the subject of cattle disease in the Banda District.

From M. H. COURT, ESQ., *Commissioner of 4th or Allahabad Division, to the Secretary to the Government of the North-Western Provinces,—(No. 77, dated 5th June* 1868).

I have the honor to submit copy of report by Collector of Banda, No. 661, dated 18th May, regarding the cattle disease in the district of Banda, on which you desired report in your letter No. 2511, dated 2nd instant.

2. Mr. Sandys has been called upon to report up to date, and I will report further hereafter.

From M. SANDYS, ESQ., *Officiating Collector of Banda, to the Secretary to the Board of Revenue, North-Western Provinces,—(No. 661, dated 18th May, 1868).*

In reply to Circular Order B., dated 27th March 1868, I have the honor to state, that in this district 1,310 heads of cattle are reported to have died of a disease similar to the cattle disease in the Hurdui District. The accompanying statement shows the names of the pergunnahs and villages in which the disease has appeared up to the present date, and furnishes, I trust, all further information required on the subject.

2. In Tirohan the disease appeared as early as February. More than half the deaths reported have occurred in Pergunnah Kamasin, but the disease has there been confined to five villages, and is said to be passing away. In Pergunnahs Kamasin, Budousa, Seonda and Banda, the kharee or Oudh salt is used. In Mouzah Itwan, Pergunnah Banda, out of 62 attacked 40 recovered. Every endeavour is being made to separate the diseased from healthy animals.

Statement of Cattle Disease.

Name of Pergunnah.	Village.	Number of deaths reported.	REMARKS.
KAMASIN ...	Mooseewan	200	This disease is passing away.
	Kuthar	30	
	Beena	150	
	Kulwarah	200	
	Paharee	200	
TIROHAN ...	Beelah	10	Ditto ditto.
	Radhooah	20	
	Toonah	50	
	Beyur	150	
	Kooleha	...	No detail received from the Tehseeldar, the disease still exists.
	Semrah	...	
	Jumroh	...	
	Anwanee	...	
	Madhoha	95	
CHIBOO ...	Seesa	...	
	Khandeha	...	
	Rungurh	...	
	Koolmuzrah	...	
	Katha Dandee ...	125	Has passed away.
BUDOUSA ...	Toorrah	22	Do. except in Kurcha, where it has just appeared.
BANDA ...	Itwan	1	
	Suhanah	...	
	Kurcha	14	Still exists.
SEINDA ...	Girwan	24	
	Narainee	15	
	Urjoonah	4	
	Sountah	...	Has just appeared.
OUGASSEE ...	Jugooah	...	
	Mureeh ...		
	Total ...	1,310	

M. SANDYS,
Officiating Collector.

Memo. from M. SANDYS, ESQ., *Officiating Collector of Banda, to the Commissioner of Allahabad,—(No. 662, dated 18th May 1868).*

Cattle disease in the Hurdui District.

In reply to his Circular No. 16, dated the 11th ultimo, forwards copy of this office letter No. 661, of to-day, to the address of the Secretary to the Board of Revenue, on the above subject.

From M. H. COURT, ESQ., *Commissioner of 4th or Allahabad Division, to the Secretary to the Government, North-Western Provinces,—(No. 24, dated 20th June* 1868.)

In continuation of my letter No. 77, dated 5th instant, I have the honor to submit, in original, for the information of His Honor the Lieutenant-Governor, report from Collector of Banda regarding cattle disease in that district.

From M. SANDYS, ESQ., *Officiating Collector of Banda, to the Commissioner for the 4th Division, Allahabad—(No. 751, dated 16th June* 1868.)

With reference to your docket No. 79, dated 5th instant, I have the honor to report, that a disease showing symptoms similar to the cattle disease in the Hurdui District appeared in this district: first in Pergunnah Tirohan, then in Pergunnah Dursenda, afterwards in Pergunnahs Budousa, Seonda, Banda, and Chiboo, and lastly in Pergunnahs Ougasee and Pylanee.

2. In Pergunnahs Seonda and Banda the disease is said to have come from the adjoining Native States. But such was not the case in Tirohan, and more than two-thirds of the total number of deaths have occurred in 15 villages in Pergunnah Dursenda, and in 15 villages in Pergunnah Ougasee, which do not border on Independent States.

3. There was no serious mortality till April. The latest returns show that 5,035 head of cattle have been attacked, and that 2,461 have died. That less than half of the deceased animals should only have died is not to be attributed to any skilful treatment of those infected. No remedies were resorted to, the disease being looked upon as a plague and incurable. In some pergunnahs the mortality is stated to have been greatest among bullocks, and in others among cows. Buffaloes have also been attacked.

4. I have made careful inquiry and have been unable to discover that there were any grounds for the report that appeared in the *Pioneer* Newspaper as to cattle having been taken across the Jumna in consequence of the prevalence of the cattle disease in this district.

5. The "khuri" or buch salt is generally used in this district.

6. Strict injunctions to isolate all diseased animals and prevent communication were issued. I am glad to say the epidemic has entirely disapeared in Pergunnahs Banda, Dursenda, Tirohan, Budousa, Chiboo, and Pylanee, and that it exists now only in five villages in Pergunnah Ougasee and in four villages in Pergunnah Seonda.

From R. SIMSON, ESQ., *Secretary to the Government of the North-Western Provinces, to the Secretary to the Government of India, Home Department, Simla,—(No. 267A, dated, Nynee Tal, the 13th August* 1868.)

I am now directed to acknowledge receipt of your letter No. 615, dated the 8th February last, and enclosures, in which it was inquired whether the cattle disease which appeared in the Hurdui District of

Oudh was known in the districts of these provinces, and if so, whether there was any appreciable difference in the health of the cattle in places where salt was abundant, and where it was scarce.

2. In reply, I am desired to forward, for submission to His Excellency the Viceroy and Governor General in Council, the accompanying copy of a letter from the Secretary to the Board of Revenue, North-Western Provinces, and of its enclosure, and to observe that so far as the evidence brought out in this inquiry goes, it would seem to prove that the inability to provide edible (taxed) salt, to cattle within the frontier salt line, has no perceptible connection with the disease.

From W. C. Plowden, Esq., *Secretary to the Board of Revenue, North-Western Provinces, to the Secretary to the Government of the North-Western Provinces,* —(*No. 537, dated, Allahabad, the 22nd July* 1868.)

With reference to the orders of Government, No. 255, dated 28th February last, in the Revenue Department, I am directed by the Board of Revenue to submit, for the information and orders of His Honor the Lieutenant-Governor, the accompanying abstract of reports received from the several district officers in these provinces, on the subject of cattle disease.

Abstract of replies to Board's Circular No. B, dated 27th March 1868, *on the subject of Cattle Disease.*

Superintendent, Dehra Doon.—Reports that the disease in question is not at the present time prevalent in his district, but it is one that has occasionally broken out for a short time and then disappeared without extending far beyond the place of its first appearance. It occurs oftener in the hot and rainy seasons than at any other time. Its symptoms are loss of appetite, passing of blood, and in some cases the animal emits a quantity of saliva from its mouth, which has an unpleasant odour. Cannot find that ulcers or sores in the throat ever appeared. The animal generally dies within a day or two after it has been attacked. The people term the disease "waha." Last year several cattle died in the immediate neighbourhood of two villages, one in the Eastern and one in the Western Doon, but as the pestilence was by no means general, not having spread beyond these vicinities, nothing was heard about it. The remedies adopted are oil and ghee, or a decoction of sheesham tree leaves, but their application seldom proves to be effectual, in nine cases out of ten the animal dies. It is said that males and fat, well-conditioned animals are oftener attacked than females and the lean kind, and further, that the disease is more prevalent among bullocks than buffaloes. When this disease appears, the people do not allow their healthy cattle to come near those infected. It is evident therefore that they consider it of a contagious nature. Salt has never been tried as a remedy.

Collector of Saharunpoor.—States that the common cattle disease called "seer" or "*rorha*" or "*rorh,*" had been unusually virulent in his district during the latter part of the rainy season. Submits a statement shewing he result of enquiries made by tehseeldars, and the extent of mortality* which he considers greatly exaggerated. The disease was not confined to one locality, but extended throughout the district, though in the north its ravages were comparatively insignificant: knows nothing as to origin of disease, although aware of its existence for years past. It is not believed to be contagious. Submits a memorandum drawn up by Dr. Cutcliffe, Sanitary Officer of the Meerut District, on the subject of this disease.

* *Tehseels.*	*No. of deaths.*
Saharunpoor	2,499
Roorkee	2,269
Deobund	12,408
Nukoor	7,700
Total ...	24,876

Collector of Moozuffernuggur.—Reports, that after inquiry he finds that the cattle disease generally occurs to a certain extent at the close of the rains. The symptoms are lethargy, want of appetite, watery discharge from nostrils and eyes, and looseness of the bowels; at first the animal passes very liquid matter of a yellow and greenish hue, which is afterwards followed by blood. In weak animals the disease is fatal in from seven to ten days, but the stronger last out fifteen days. Towards the last stage dislike to cold water is apparent and the natives administer tepid. Last October, after the rains about 10 per cent. of the cattle died. Agriculturists do not give their plough or well bullocks salt, except as medicine when they are sick, but bullocks kept for conveyance or drawing large cart loads of merchandise get salt once a week or oftener. The second type of the disease, *viz.*, worms attacking different parts of the animal, has not been observed in his district. The custom of not giving salt to the cattle kept for agricultural purposes is probably on account of the expense. Salt (Sombhur) selling now for 6 seers per Rupee, but even when it was cheaper, it was not given as far as he can ascertain. The remedies used by the natives are warm ghee, about one seer in three days given in small doses. Salt three times a day, ajivan (Indian carraway) and onions roasted and pulped. They also give cakes made of oordh dal. The disease seems to have prevailed throughout the four tehseels of his district, and on all lands whether Khadir or Bangur. The natives do not appear to separate the sick from the sound cattle, but keep them all huddled together in the same enclosure. There has been no complaint of extraordinary sickness among cattle during the past year.

Collector of Meerut.—States that the only form of disease amongst horned cattle in his district is that known as "rora." The symptoms are alike every where, first the hoofs are attacked by maggots and begin to decay, then diarrhœa sets in, with running at the nostrils and eyes; the animal refuses to chew its cud, refuses food, and gradually grows weaker till death occurs or recovery begins. Result of sickness is usually known in a week. It is believed to be infectious, but has never spread to any extent, nor of long duration. Commencing in August, it disappears about end of September. The mortality has never been so great as to attract attention or create any serious apprehension. At present

no such disease is prevalent in his district. The treatment followed by the people is simple, but its efficacy has not been tested by any competent person. The animal's feet are frequently bathed in the refuse water of tanneries or distilleries, and half baked "oorud" (pulse) cakes with mustard oil and onions administered internally. In some localities a decoction of "mendee and sheeshum" leaves is given. The use of salt as a remedy is unknown, as it has a laxative tendency, and would only help to aggravate diarrhœa. States from personal knowledge and observation that the disease generally prevails where salts are found in abundance in the surface earth. The only part of his district that suffered to any noticeable extent during past year was the Burnawa Pergunnah in Sirdhana jurisdiction, where in one village two hundred head of cattle died in two months, but the disease died out there and was not communicated to surrounding villages. Disease of the character described in the correspondence has not reached his district.

During the rains of 1866 large numbers of sheep were attacked with a disease, the exact nature and origin of which have not yet been ascertained, and which caused great mortality; not more than 10 per cent. of those attacked being saved.

Collector of Boolundshuhur.—States that no such disease as that described by the Board has made its appearance in his district. Generally, from November to January, cattle suffer from what appears to be a species of influenza accompanied by diarrhœa. This may fairly be accounted for by the change of season, bad food and want of proper shelter. Cows, female buffaloes, and the more valuable class of bullocks, get salt occasionally, but this supply is rarely given and in small quantities. Ordinary kind of cattle hardly ever get any at all; opinions seem to vary about the use of salt as a preventive, but the evidence is generally in favor of its use.

Collector of Allygurh.—States that there has been no cattle disease in his district.

Commissioner of Kumaon.—States that the cattle disease is as well known in Kumaon as small-pox among human beings. The disease known as "maan" appears more or less every year; when it comes regularly it is less fatal, but is considered very virulent when appearing after a lapse of two or three years. This disease only attacks cattle once, and those which recover are safe from it for ever. A "muntwar" bullock or buffaloe is one which has had "maan" and is much more valuable than those which have not had the disease, and it is not uncommon in sale of cattle for seller to certify that the animals sold are "mantwar." No attempt is made to separate the healthy from diseased cattle, as it is believed that all buffaloes, cows and bullocks, must get the disease over, and though people will not take their cattle to a place where the disease prevails, there is no attempt at separation after the disease appears. The disease is generally believed to be contagious. The description of the disease given by Dr. McReddie exactly corresponds with this disease, which has been known in the Hills and Bhabur forests from of old; it is even known in the Snowy Range, and sometimes carries off large numbers of jooboos,* but in such cases the

* Cross between the cow and yak used by the Bhootya traders in crossing the snowy passes.

disease is believed to be taken up by the Bhootya traders from the lower country. Horses, sheep, and goats, are not known to have been attacked by "maan."

Senior Assistant Commissioner, Kumaon.—States that there is no cattle disease prevalent, but that in the Eastern Pergunnahs the cattle have been suffering rather severely from a disease known in the Hills as "maan." Unhealthy and diseased cattle have, as usual, been isolated. The people do not attribute the disease above referred to, to any scarcity of salt, the fact being that salt is seldom if ever given in the Hills to plough cattle.

Senior Assistant Commissioner, Gurhwal.—Reports that during the months of October to January a somewhat similar disease called by the natives "maan" was prevalent in the Bhabur of his district. The natives describe it as the "cattle cholera," and said that in some instances the animals infected died quickly, but generally lingered on for some time, gradually wasting away. The symptoms were something like those described by Dr. McReddie though he heard of no sores in the throat. Natives considered it highly contagious, and as far as possible, he tried to separate the infected from disinfected cattle, though with little effect. One fact which came to his knowledge rather impressed him with the idea that it required close contiguity to infect with the disease. One shed, which was between two infected ones and not far from either of them, entirely escaped. Has no means of accurately ascertaining the nature of the disease, but as far as he could gather from the reports made, it appears that in most cases about half the infected cattle died, and in some instances the proportion was greater. Some sheds being quite in the jungle, rendered it difficult to obtain intelligence.

Collector of Bijnour.—States that a cattle disease of the nature referred to has appeared in his district, was very prevalent during the autumn of last year, and continued with diminishing virulence through the cold season, disappearing altogether in April. It was most common in the Forest Pergunnahs of Burrapoora and Afzulgurh, and along the Ganges Khadir, but found its way into other districts also. The disease is known by the name of "bedun" or "chera," and is believed to be contagious. Has been very fatal in the district, the proportion of mortality to cases being differently stated as one-half, two-thirds, and three-fourths. Animals attacked refuse food, and at first show a watery discharge from the mouth, nose, and eyes, sores then form in the mouth and feet, and at a later stage the intestinal discharge becomes bloody. Believed to arise from feeding on unwholesome grasses, as it usually occurs in the latter part of the rainy season. Treatment adopted is to feed the animals on cakes of pease flour or rice cake, soaked in oil, also with leaves of sissoo and neem trees. Externally poultices made from leaves of "keekur" and kuchnar," also "ag," are applied to the sores. If disease is arrested in its earliest stages it is usually cured, but when once the bloody intestinal discharge is developed, recovery is rare.

Collector of Moradabad.—Last September and October there was a slight mortality among the bullocks and cows, the symptoms of which

were analogous to those described by the Deputy Commissioner of Hurdui. Those attacked generally died, but the number was very inconsiderable. A great many buffaloes died, especially those grazing in large herds along the Turai and Ganges Khadir. The number, however, was not sufficient to cause any serious loss to the agricultural class.

Collector of Budaon.—The cattle disease described by the Deputy Commissioner of Hurdui is a very common disease in Budaon. It is called "bedun." The symptoms have been correctly described, with this exception that the sores in the mouth and feet are not exactly a different type of the disease, but seem rather to follow on the first form, *viz.*, that of passing of the bloody fœces. If cattle escaped the first form of the disease they are generally attacked with the second. It is more common and fatal among buffaloes than to other horned cattle. The natives never give salt to an animal when attacked, as they say very truly that it makes the animal purge still more. Their treatment is confined to "surd dewaees," *i. e.*, cooling medicines, and amongst other things they give geroo (red clay) as also pindol earth. Does not consider these remedies prove beneficial. Thinks that tonics and stimulating medicines should be administered. The disease prevailed for a couple of months during the last rainy season, and it is always known when the disease is going about by seeing strings stretched across at the entrance of a village under the impression that it keeps off infection. Does not consider that excessive rains have any thing to do with the disease, it having raged in the height of the cold season. Is of opinion that the removal of the kharee tax would be hailed as a great boon by the agricultural community, but does not see at the same time that salt has any thing to do with the complaint. It has been prevalent in Hindoostan for years, and at times when there was no restriction or duty on kharee salt, which is what cattle get.

Collector of Bareilly.—Reports that from enquiries made it does not appear that any such disease among cattle has appeared in his district.

Collector of Shajehanpore.—States that no cattle disease of the kind referred to has appeared in his district, except in some villages bordering the river in Pergunnah Jellalabad, where some cattle were affected by the disease during the months of August 1867 to January 1868. It is the general opinion of the villagers that the disease attacked those cattle only that grazed over the land which was covered for some time by the water of the floods caused by the rains.

Superintendent, Terai Pergunnahs.—Reports that a similar disease attacked the cattle in the Terai. It commenced shortly after the rains ceased, and continued till the latter end of January 1868. From returns collected there are 46,880 heads of cattle, from which number 12,221 were attacked, and of these 8,912 died, giving a percentage of deaths of 190 per 1,000 on the total cattle, and 730 per 1,000 on those attacked. The symptoms were very similar to those described in the correspondence sent. Intense thirst followed by bloody stools; when the disease went so far as passing blood, recovery was considered impossible. The animal generally died on the third or fourth day after its attack. It is universally stated that it is no new disease, but one that in former years used to

appear every season, it is called "chera." The natives have no satisfactory cure for it. The following reason is advanced for its violence this year—that not having broken out for so many years, there were a great number of cattle liable to take it. Isolation was recommended and carried out where possible. The loss to cultivators and owners is very great; as far as he could ascertain, is of opinion that cattle well taken care of, getting proper food and salt, do not suffer from it. The disease did not affect the cattle belonging to the Tharoo population as they take greater care of their animals than the others. It is admitted by the cultivators that when salt was cheap, they used to give it, but not so much since it has become dear. At the same time they do not seem to think that the severity of the disease is entirely due to this. There are doubtless other causes which will account for it. Considers that want of proper treatment with the absence of salt is one, but there is not sufficient evidence to establish it as a principal cause.

Collector of Muttra.—Intimates that no cattle epidemic has appeared during the past year. Slight local sickness may have broken out in isolated villages but not of a contagious nature to render a special report on even the tehseeldar's part at all necessary. The salt line bisects the pergunnahs of Kosee and Chaata, and the Sudder. No appreciable difference in the health of the cattle on either side is noticeable. Villages on both sides of the lines have suffered equally, though in a very slight degree.

Collector of Agra.—States that there has been no disease among the cattle in his district. Cattle outside the Customs line are reported in better condition than those inside, owing to cheapness of salt in the former locality.

Collector of Furruckabad.—No epidemic among cattle appeared in his district.

Collector of Mynpoorie.—Reports the prevalence of a disease apparently of the same type as the Hurdui epidemic in some parts of his district. The first case observed by him was towards the end of October last, the symptoms, as marked and noted down at the time, are as follow:—"Refusal to eat, followed by much diarrhœa and fever, apparently with great thirst, exhaustion and death about third or fourth day." He has been unable to ascertain any facts to connect the disease with a deficient supply of salt, on the contrary thinks such is improbable, owing to the strong saline impregnation in the soil.

Goats and sheep appear also to have suffered much.

Collector of Etawah.—No epidemic among cattle appeared in his district.

Deputy Collector of Etah.—Reports that the mortality among the cattle was very great from a disease similar to that described by the officers of Hurdui about the close of last rains and the commencement of the cold season. The disease is described as contagious, any village which was attacked, suffering severely. In the Etah tehseel, the loss is roughly estimated at five head per village. This loss, however, includes the number of deaths of sheep and goats which suffered very severely.

from "bissee," ulceration of the mouth, brought on by continued browsing on wet grass, which is said to harbour a fish which produces the sores. Cannot vouch for the correctness of this, but sheep and goats are more susceptible of wet than cattle, and the rains were unusually heavy. The statistics which were sent in by the tehseeldars, include the number of deaths of cattle from all causes during three months, and affords no liable data on which to estimate the ravages of the particular disease or plague which appeared among the cattle about the end of the rains. The country people do not ascribe the disease to want of salt, but understands that the only cattle which ever get salt, are the draught cattle of the wealthier classes which are driven in ekkas, bheilees, &c. The disease is vaguely ascribed to some noxious atmospheric agency.

Deputy Commissioner of Jaloun.—Reports that no disease as that described in Hurdui has attacked the cattle in his district, or even the neighbouring Native States. Want of sufficient salt renders no doubt all cattle more liable to epidemic diseases, and he has heard it stated by the natives that their cattle do not get a sufficient quantity of salt owing to the high price it is sold for.

Deputy Commissioner, Jhansie.—No such epidemic, but "gooshela" (which destroys the hoof) and cow-pox are the diseases known in his district. Has heard of another disease which attacks the mouth and palate, but it in no way answers the description of the disease mentioned by Dr. McReddie.

Deputy Commissioner, Lullutpore.—No such epidemic prevalent in his district.

Commissioner of the Allahabad Division.—Reports that the epidemic in his division appears to be confined to the country south of the Jumma. No disease of the kind mentioned appeared in the districts of Futtehpore and Jounpore; submits replies from Allahabad and Humeerpore.

Collector of Cawnpore.—States that careful enquiries have resulted in showing that the disease has not spread in any epidemic form into his district. He is of opinion that the extraordinary nature of the season consequent on last year's rains is much more likely to have been the cause of the epidemic than the want of salt. The latter cause has all along existed, and all Indian animals compensate themselves for the want of it by eating human ordure when they get it, or licking the saliferous earth in default.

Collector of Futtehpore.—No disease of the nature referred to having attacked the cattle, is unable to say anything regarding the use of salt.

Collector of Banda.—Reports that 1,310 head of cattle died of a similar disease to that which appeared in Hurdui. Submits a statement shewing the names of the pergunnahs and villages in which the disease has appeared up to the present date. In Tirohan, it appeared so early as February; but more than half of the deaths occurred in Pergunnah Kamasin, and the disease has there been confined to five villages, and is said to be passing away. In Pergunnahs Kamasin, Budousa, Seonda,

and Banda the kharee or Oudh salt is used. In Mouzah Itwan, Pergunnah Banda, out of 62 attacked 40 recovered. Every endeavour is being made to separate the diseased from the healthy cattle.

Collector of Allahabad.—States that from reports received from tehseeldars, the cattle disease seems entirely confined to Pergunnah Barrah, and the portions of the district bordering on it, *viz.*, in Arail and Khyragurh the cattle have died from disease, but only in the villages close to Barrah the disease has been very slight. The other pergunnahs are quite free. Up to the 29th April 1868, 230 head of cattle had died in Barrah and 138 in Arail. The symptoms are the usual ones of loss of appetite, discharge from mouth and nose, and eruptions. The tehseeldars and police officers have been directed to instruct the villagers to separate at once any animal attacked from the rest of the herd, and on no account to let the person who attends it go any where near them. This measure appears the best substitute for what, if it could be managed, would be more efficacious, *viz.*, to kill the sick animal at once and burn its carcase; but naturally the religious feelings of the zemindars would prevent the latter remedy. The disease has abated, and on receipt of the further report called for from tehseeldars will submit it for information.

Collector of Humeerpore.—Reports that a disease made its appearance in Pergunnah Humeerpore, the symptoms of which are almost exactly similar to those described by the Deputy Commissioner of Hurdui. The mortality does not appear to be very great yet. The tehseeldars of the other pergunnahs report the existence of a disease (or as having existed,) among the cattle, but the description does not answer to the disease, which forms the subject of the present inquiry, nor is it of the character of an epidemic. It is reported by the naib Tehseeldar of Humeerpore, that the cattle are not porperly taken care of, and such as received no salt were the first to be attacked, whilst, on the other hand, cattle carefully tended catch the disease by mixing with those attacked.

Collector of Jounpore.—No cases of cattle disease.

Collector of Goruckpore.—No cases of cattle disease.

Collector of Bustee.—States that, except in the Bustee Tehseel, no sickness resembling that described as having broken out in the Hurdui District has appeared in his district during the past years. In the Bustee Tehseel, which is separated from the Fyzabad District by the River Surjoo, only a sickness resembling that described and locally termed "petbhagee" was prevalent. The symptoms were langour, refusal to eat, diarrhœa, bloody stools, a swollen appearance and sometimes maggot infested lips. Kharee was used as a remedy, but without much effect. Sambhur is too expensive. The disease cannot be termed a "plague," as the number of cattle affected was very small. In Bansee to the north-east there was considerable sickness in September and October 1867, but not of the kind described. Eight different cattle diseases are known in his district, but none have yet spread so fatally as to deserve the name of rinderpest.

Collector of Azimgurh.—States that no disease of an exceptional nature has appeared among the cattle during the past cold season. The tehseeldar of Mahool, whose tehseel jurisdiction borders upon the Fyzabad District in Oudh, reports that there has been a good deal of mortality among the cattle, but, as far as can be ascertained, there has been no contagious disease. No district officer has heard of any such disease having broken out, and Mr. Martin, a zemindar in Pergunnah Mahool, is of opinion that there has been no extraordinary mortality.

Collector of Mirzapore.—Reports that no such disease has yet appeared.

Collector of Benares.—Reports that no such disease has yet appeared.

Collector of Ghazeepore.—States that no such disease of the nature referred to has made its appearance for some time past. Never heard during his tour, last cold season, that any contagious disease appeared. It was reported that there were a few cases of cattle disease in Pergunnah Zumuneah on the other side of the Ganges. At his request Mr. Burke Farrier, after investigation, reported that the disease was a contagious typhoid fever. This has considerably abated since.

In continuation of previous report, states that the cattle disease in this district has abated considerably; 180 deaths are reported in Beerpore.

Veterinary Surgeon, Central Stud, Ghazeepore.—Reports the existence, in many parts of the district, of a cattle disease, which is a malignant typhoid fever, infectious, and generated probably by miasma in the atmosphere, caused by overcrowding of animals in ill-ventilated buildings, and insufficient nourishment. Recommends certain measures which were adopted when the disease appeared among cattle (bullocks) at the Ghazeepore Depôt in the latter part of May last, and states that two solootrees have been left in the district for the purpose of instructing zemindars in the treatment of sick cattle.

Deputy Commissioner of Ajmere.—No disease of the kind in question appeared in his district.

ALLAHABAD,
The 23rd July 1868.

(Sd.) W. C. PLOWDEN,
Secretary.

From R. SIMSON, ESQ., *Secretary to the Government of the North-Western Provinces, to the Secretary to the Government of India, Home Department, Simla,—(No. 962A, dated the 1st September 1868.)*

In continuation of the letter from this office No. 301A., dated 14th July last, I am directed to forward, for the information of the Governor General in Council, the accompanying copy of a docket* and of its enclosures from the Commissioner of Allahabad, regarding the cattle disease prevailing in the Banda District.

* No. 35, dated 17th ultimo.

Memo. from M. H. COURT, ESQ., *Commissioner of 4th Division, to the Secretary to the Government of the North-Western Provinces,—(No. 35, dated the 17th August 1868.)*

FORWARDS in original a report on cattle disease in the Banda District, with enclosures, submitted by the Collector.

From M. SANDYS, ESQ., *Collector of Banda, to the Commissioner of 4th Division,—(No. 1006, dated the 7th August 1868.)*

I have the honor to submit the report called for in letter No. 59, dated 27th June, from Junior Secretary to Government, North-Western Provinces, received under cover of your docket No. 102, dated 6th ultimo.

2. The form in which the cattle disease has appeared in this district may thus be characterized. At first langour, refusing to take food or water, prostration and fever; then on the 3rd or 4th day liquid and bloody stools, which continue with greater frequency till the death of the animal generally on or about the seventh day.

3. In some instances the progress of the disease is much more rapid, and the animal dies in 12 hours after being attacked. In others again the cattle are said to foam at the mouth and emit a reddish saliva (râl) at the time the diarrhœa sets in.

4. I have not heard of any successful treatment of this disease, and as a general rule no attempt to effect a cure is made by the owners of the animals affected, who look upon the disease as a visitation of Providence. Split gram soaked in water is reported to have been given in some cases.

5. Since the outbreak the disease has appeared in 99 villages in this district. The total number of cattle attacked has been 6,536, and total number of deaths 3,365; nearly 50 per cent., therefore, have recovered. Many of these animals were not, I believe, suffering from the epidemic, but a much more common disease called "koora," the symptoms of which are that cracks show themselves in the hoofs, sores form, slough and bleed, maggots appear, and often similar sores appear in the mouth and throat.

6. This disease is of about a month's duration and recoveries are frequent. The treatment resorted to, appears to be to cause the animals to stand on the edge of some jheel or tank, so that the hoofs are embedded in the moist mud. Some of the deaths have also been from this disease, but a large majority of the cattle have died of the epidemic I have attempted to describe in paras. 2 and 3.

7. Cattle disease of any type is reported now to exist only in six villages.

8. I beg to annex herewith a copy of a memo. drawn up by Dr. Ringer of a *post mortem* examination he has been good enough to make on the body of a bullock said to have died of the epidemic.

9. During the latter months of the cold season there was an unusual quantity of rain and steady easterly winds during the height of the epidemic. Thus, as Dr. Ringer surmises, the prevalence of the

disease may perhaps be attributable to atmospheric influences, such influences have, however, been innocuous to human beings, the health of the rural population during this period having been remarkably good.

10. I have instructed the tehseeldars to advise the zemindars of any village in which the cattle disease still exists or may hereafter appear to adopt the plan of sulphur fumigations in the manner suggested by Dr. Ringer.

Memorandum of Post Mortem Examination of a bullock supposed to have died from "Cattle Disease" prevailing in the Banda District.—(Dated 18th July 1868.)

The animal appeared to be well grown and fairly nourished, and did not shew signs of having died from a protracted disease.

There were no marks of "sores" about the mouth, or any appearance of disease of the throat or chest.

The stomach was greatly distended with undigested food, and, the "gall bladder" filled with dark coloured semi-fluid bile. The intestines did not shew any signs of "ulceration," but the mucous membrane appeared somewhat increased in vascularity. The other viscera did not in any way appear diseased.

From the history of the case which I gathered from the "owner," the animal had only been ill *four* days; the disease commenced with general lassitude, thirst, refusal of food, frequent liquid watery stools, (but *no* blood in them) followed by rapid prostration of strength. Head symptoms set in two hours before death, when the animal became (*behosh*) insensible.

It is quite impossible for me to give an opinion from the examination of this case as to the "cause or nature" of the disease; but I am inclined to think the *former* is purely atmospheric, and not of local origin, or that it depends upon the want of salt which I believe is plentiful and cheap in this district. With regard to the *nature* of the disease, I think it likely to be a form of "bilious remittent fever."

Although there does not appear to be any proof of the disease being contagious, I would strongly recommend that it be assumed to be so, and that "isolation" of the diseased cattle be strictly enforced. I would also suggest (if practicable) that "sulphur fumigations" (which have been found so efficacious in England) be adopted in the villages where the disease is prevailing. The "sheds, &c.," in which diseased animals have been fed or tied, should be well fumigated, and this can easily be done by burning a small quantity of "sulphur" (gundhuk of the bazars) upon lighted charcoal on an iron plate. It would be acting on the principle that "prevention is better than cure," if fumigations could be carried out in all the cattle sheds, &c., during the prevalence of the disease in any particular village. I have no doubt there would be great difficulty (and even perhaps impossibility) in getting the villagers to adopt these means, and I merely throw out the *hint*, in case it might be of any use in mitigating the ravages of the disease.

THEOBALD RINGER,
Offg. Civil Surgeon.



